気 象 庁 海 洋 月 報

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Climate and Marine Department
Japan Meteorological Agency

気象庁 気候・海洋気象部

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Monthly Ocean Report is prepared by the Oceanographical Division, Climate and Marine Department, Japan Meteorological Agency.

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表紙は、2000 年 11 月の太平洋の月平均海面水温偏差図です。
陰影部は、平年より高温の海域を示しています。

The figure on the front cover shows the monthly mean SST anomalies for November 2000 in the Pacific Ocean.
Areas of positive anomalies are shaded.

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海況の特徴（２０００年１１月）

日本近海の海況

海面水温は、三陸沖からオホーツク海にかけての北海道周辺で平年より 0.5℃以上低く、北海道の北では-1℃を超える負偏差となっていた。日本海東部及び常磐沖から本州南方にかけての太平洋側では平年より 0.5℃以上高く、本州南方には+1℃を超える正偏差が広がっていた（第４図）。

黒潮は、九州から紀伊半島にかけて接岸した後、上、中旬は東海沖を東南東に流れ、142°E 付近を北上して房総半島沖を北東に流れていた。下旬は、東海沖の 138° E 付近で東北東に向きを変え、八丈島付近を流れた後、142° E に沿って北上し、房総半島沖を北東に流れていた（第９図）。

親潮系の冷水の沿岸寄りの分枝は 40° N、143.5° E まで、沖合の分枝は 40° N、145° E まで達していた（第５図）。

太平洋の海況

太平洋赤道域の海面水温は、130° E から 160° E にかけて平年より 0.5℃以上高かった。一方、175° E から 150° W、135° W から 120° W、 及び 110° W から 90° W では平年より 0.5℃以上低かった。

北太平洋の海面水温は、150° E 以西の 15° N から 40° N にかけてと、25° N、170° E から 45° N、140° W にかけて平年より 0.5℃以上高かった。一方、オホーツク海南部から 40° N、170° W にかけて平年より 0.5℃以上低く、オホーツク海南部では-2℃を超える負偏差となっていた（第１６図）。

Highlights November 2000

Seas adjacent to Japan

SSTs were more than 0.5℃ below normal in seas around Hokkaido facing Sanriku and the Sea of Okhotsk. Negative SST anomalies exceeding -1℃ were found north of Hokkaido. SSTs were more than 0.5℃ above normal in the eastern part of the Japan Sea and from the seas off Joban to south of Honshu and positive SST anomalies exceeding +1℃ were found south of Honshu (Fig. 4).

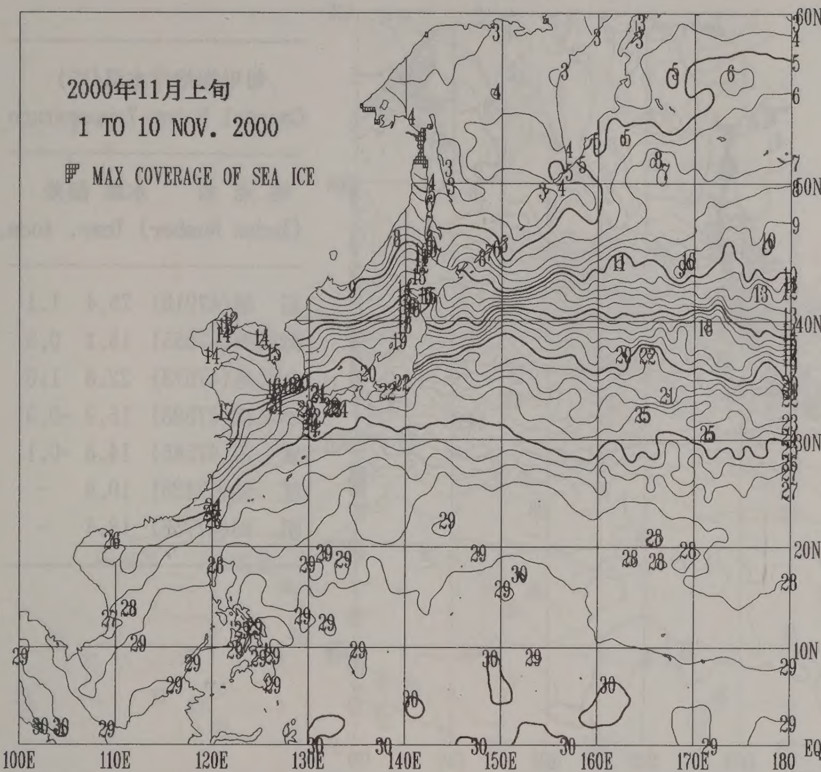
The Kuroshio flowed along the coasts from Kyushu to the Kii Peninsula. In the first and second 10-day periods of the month, it flowed ESE-ward off Tokai, northward along 142° E and NE-ward off the Boso Peninsula. During the rest of the month, it flowed ENE-ward near 138° E off Tokai and passed near Hachijo Island. It then flowed northward along 142° E and ENE-ward off the Boso Peninsula (Fig. 9).

Coastal and off-coastal branches of the Oyashio cold water extended southward to 40° N, 143.5° E and 40° N, 145° E, respectively (Fig. 5).

Pacific Ocean

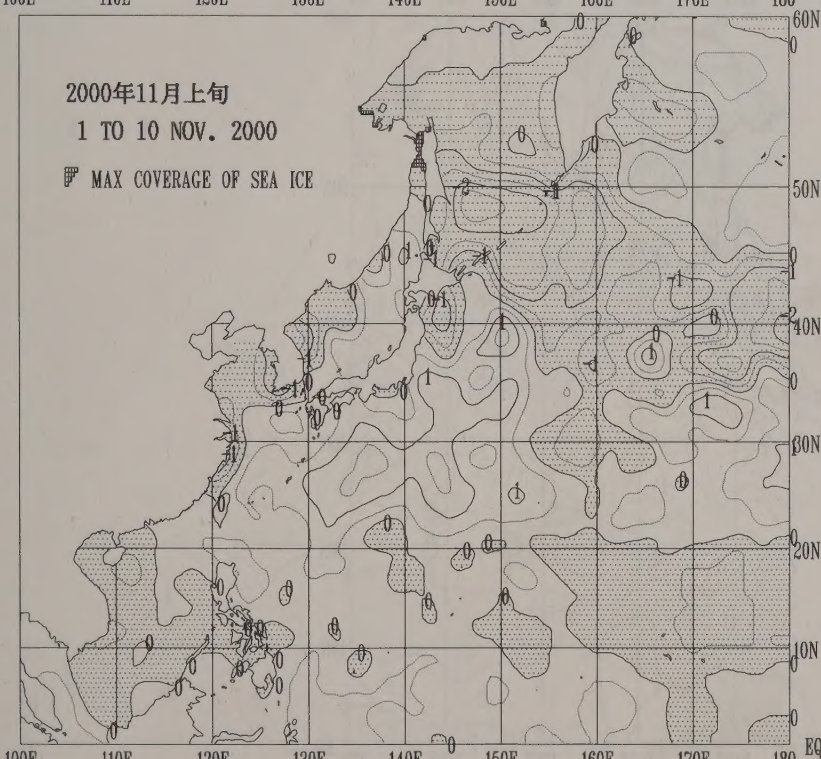
In the equatorial Pacific, positive SST anomalies exceeding +0.5℃ were found between 130° E and 160° E. Negative SST anomalies exceeding -0.5℃ were found between 175° E and 150° W, between 130° W and 120° W and between 110° W and 90° W.

In the North Pacific, SSTs were more than 0.5℃ above normal between 15° N and 40° N west of 150° E and in seas from 25° N, 170° E to 45° N, 140° W. SSTs were more than 0.5℃ below normal from the southern part of the Sea of Okhotsk to the seas around 40° N, 170° W. Negative SST anomalies exceeding +2℃ prevailed in the southern part of the Sea of Okhotsk(Fig. 16).



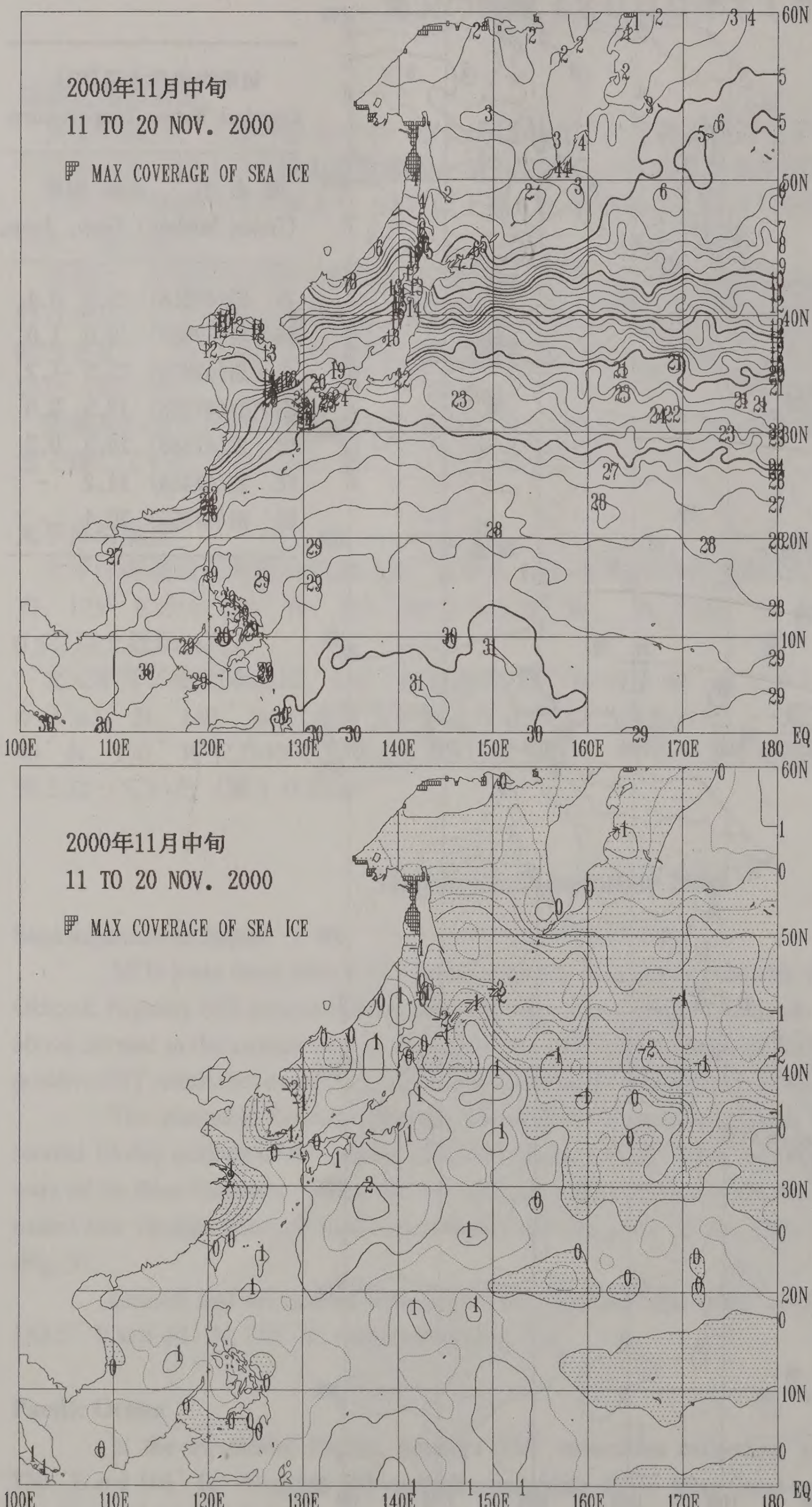
旬平均沿岸水温(℃)
Coastal Water Temperature

地点名 (Index Number)	水温 Temp.	偏差 Anom.
石　垣(47918)	25.4	0.4
御前崎(47655)	19.9	1.0
八丈島(47678)	21.5	-1.2
小名浜(47598)	17.5	0.0
宮　古(47585)	16.3	0.5
江　差(47428)	14.2	-
浜　田(47755)	20.4	-



第1図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(2000年11月上旬)

Fig.1 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 1st ten-day period in NOV 2000. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.

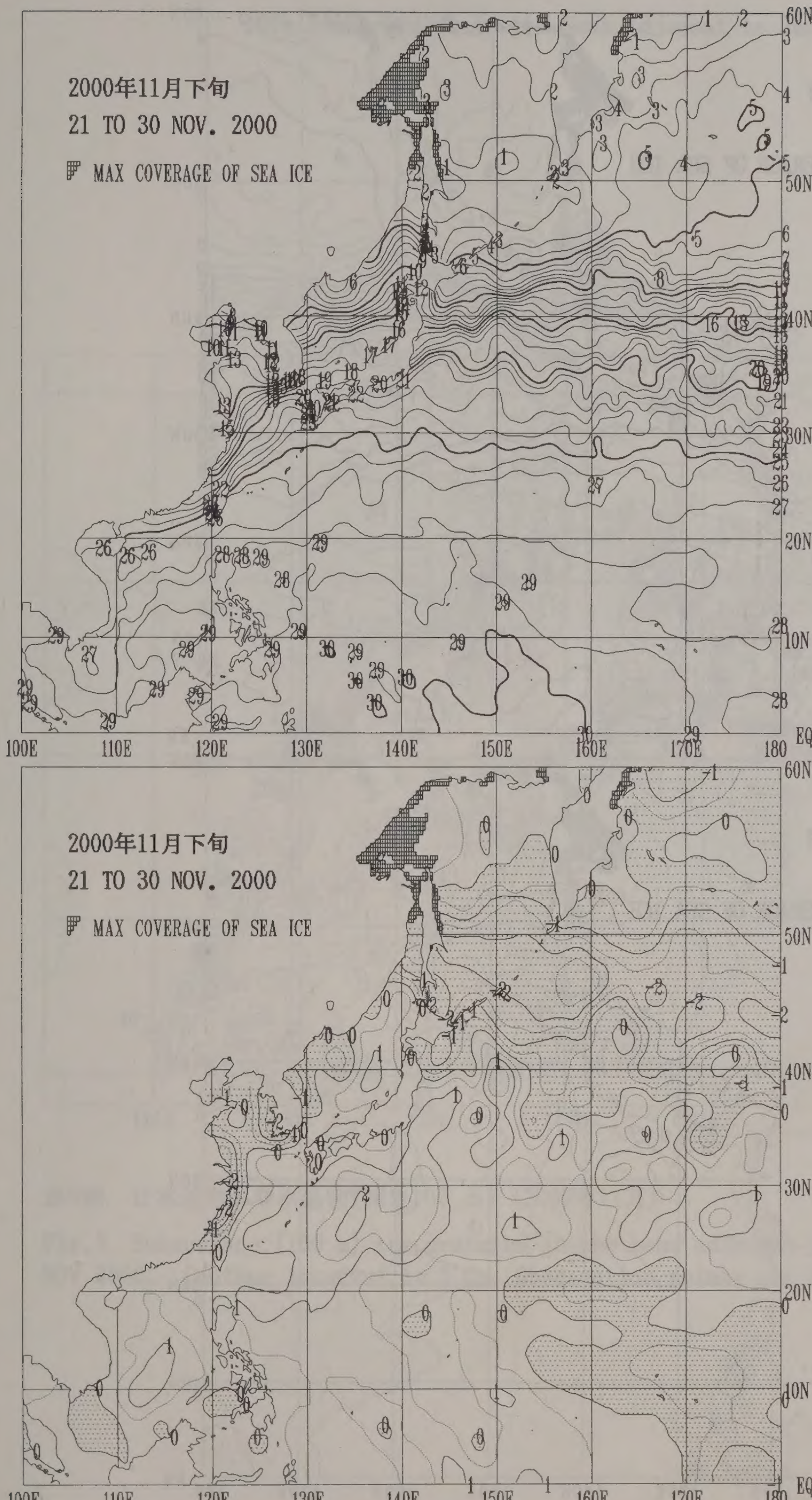


旬平均沿岸水温(℃)
Coastal Water Temperature

地点名 (Index Number)	水温 Temp.	偏差 Anom.
石　垣(47918)	25.4	1.1
御前崎(47655)	18.1	0.8
八丈島(47678)	22.8	1.0
小名浜(47598)	15.9	-0.3
宮　古(47585)	14.8	-0.1
江　差(47428)	10.4	-
浜　田(47755)	18.4	-

第2図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(2000年11月中旬)

Fig.2 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 2nd ten-day period in NOV 2000. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.

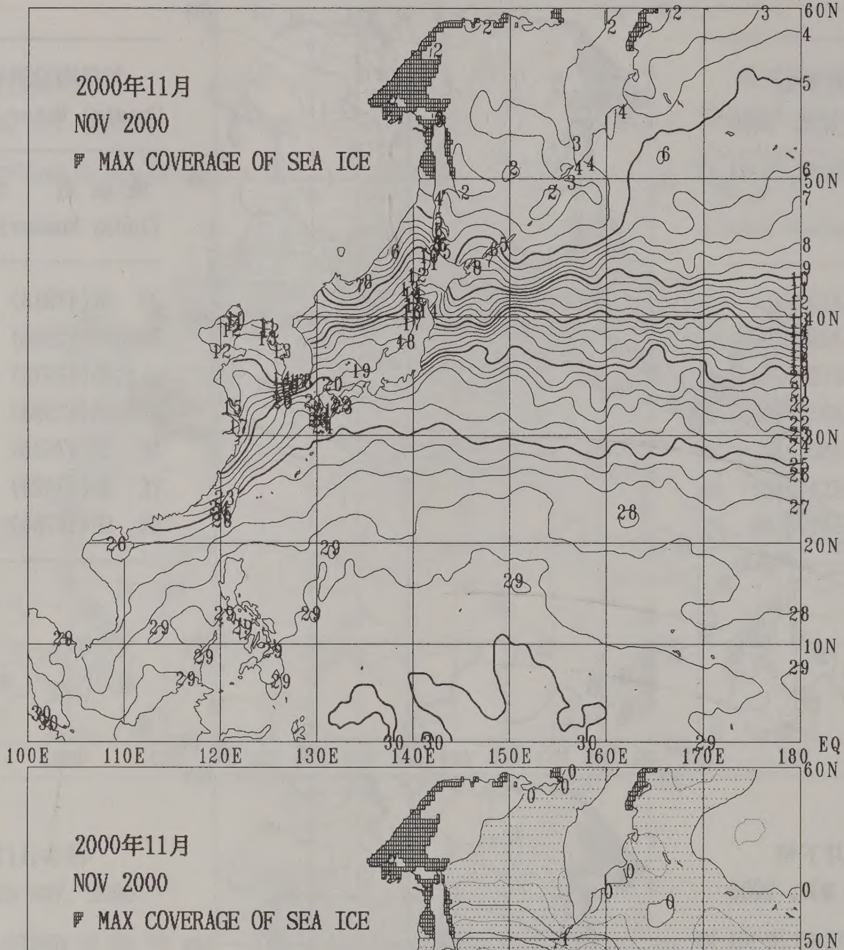


旬平均沿岸水温(℃)
Coastal Water Temperature

地 点 名 (Index Number)	水温 Temp.	偏差 Anom.
石　垣(47918)	24.5	1.3
御前崎(47655)	17.3	1.4
八丈島(47678)	21.3	0.4
小名浜(47598)	14.7	-0.3
宮　古(47585)	13.4	-0.3
江　差(47428)	8.7	-
浜　田(47755)	17.1	-

第3図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(2000年11月下旬)

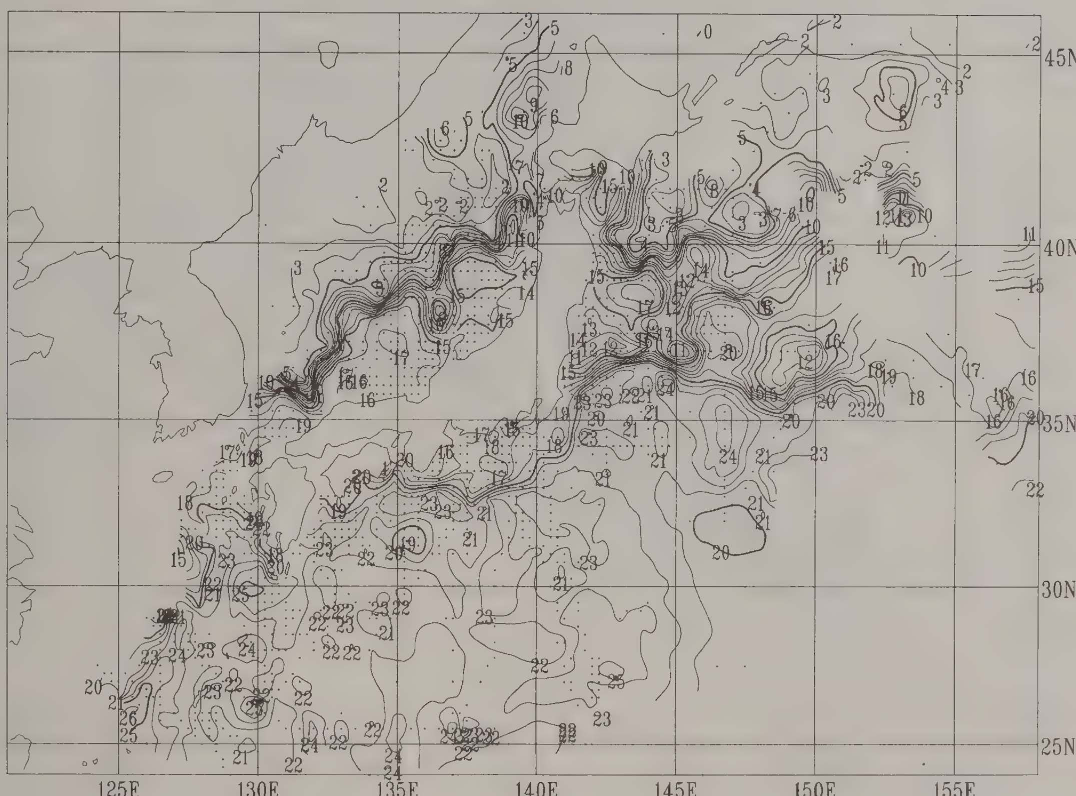
Fig.3 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 3rd ten-day period in NOV 2000. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



第4図 北西太平洋月平均海面水温図(上)及び偏差図(下)(2000年11月)

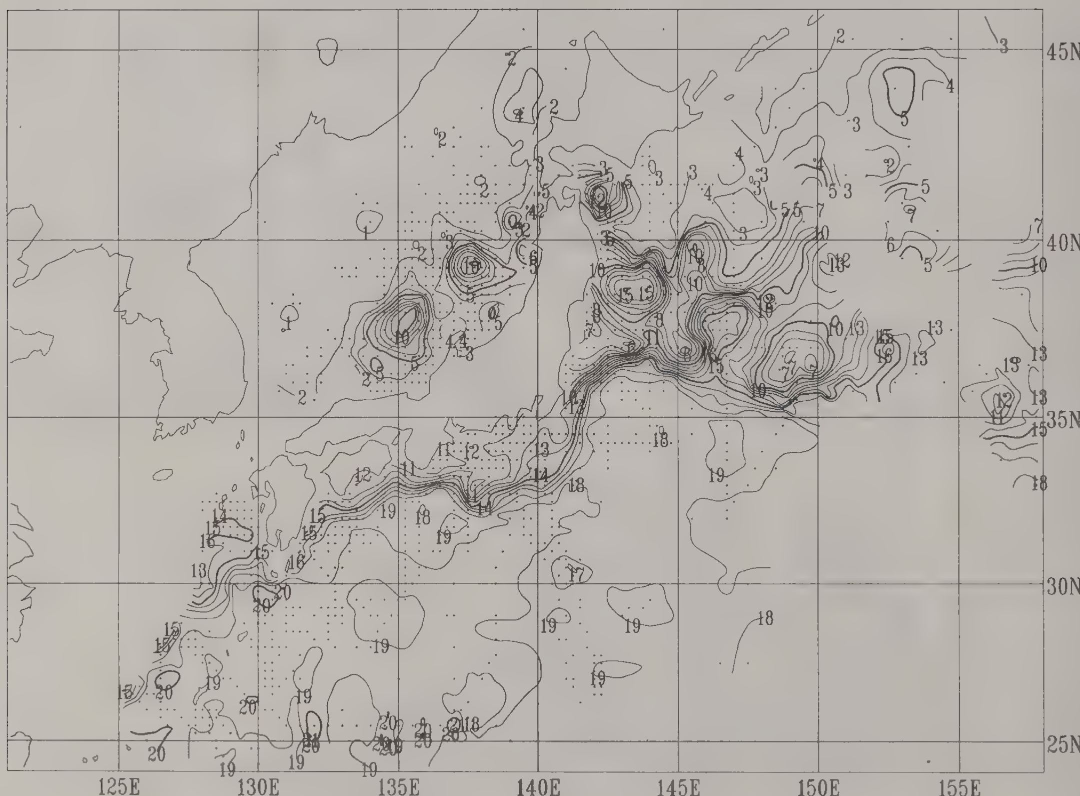
Fig.4 Monthly mean SST (top) and anomalies (bottom) in the western North Pacific for NOV 2000. Anomalies are computed from the JMA climatology (1961-1990). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.

100m Temperatures in the Seas Adjacent to Japan



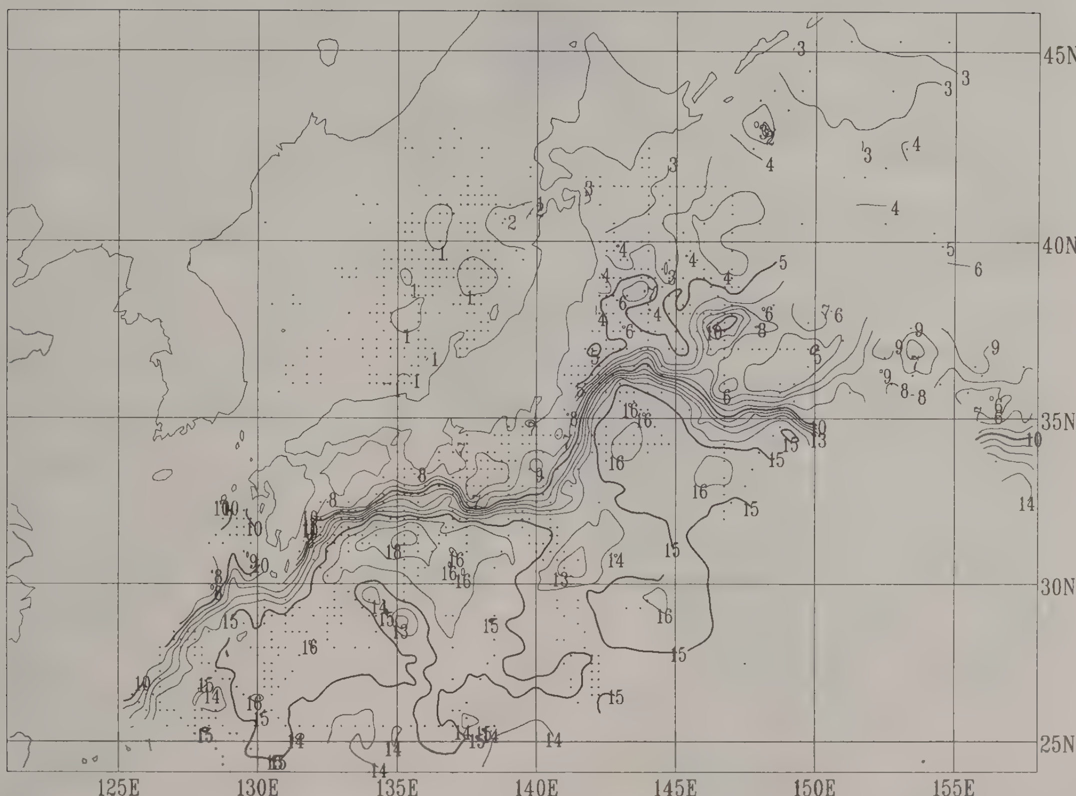
第5図　日本近海表層水温図(深さ100 m) (2000年11月)

Fig.5 Subsurface (100 m) temperatures in the seas adjacent to Japan for NOV 2000. Contour interval is 1°C. Observation points are denoted by dots.



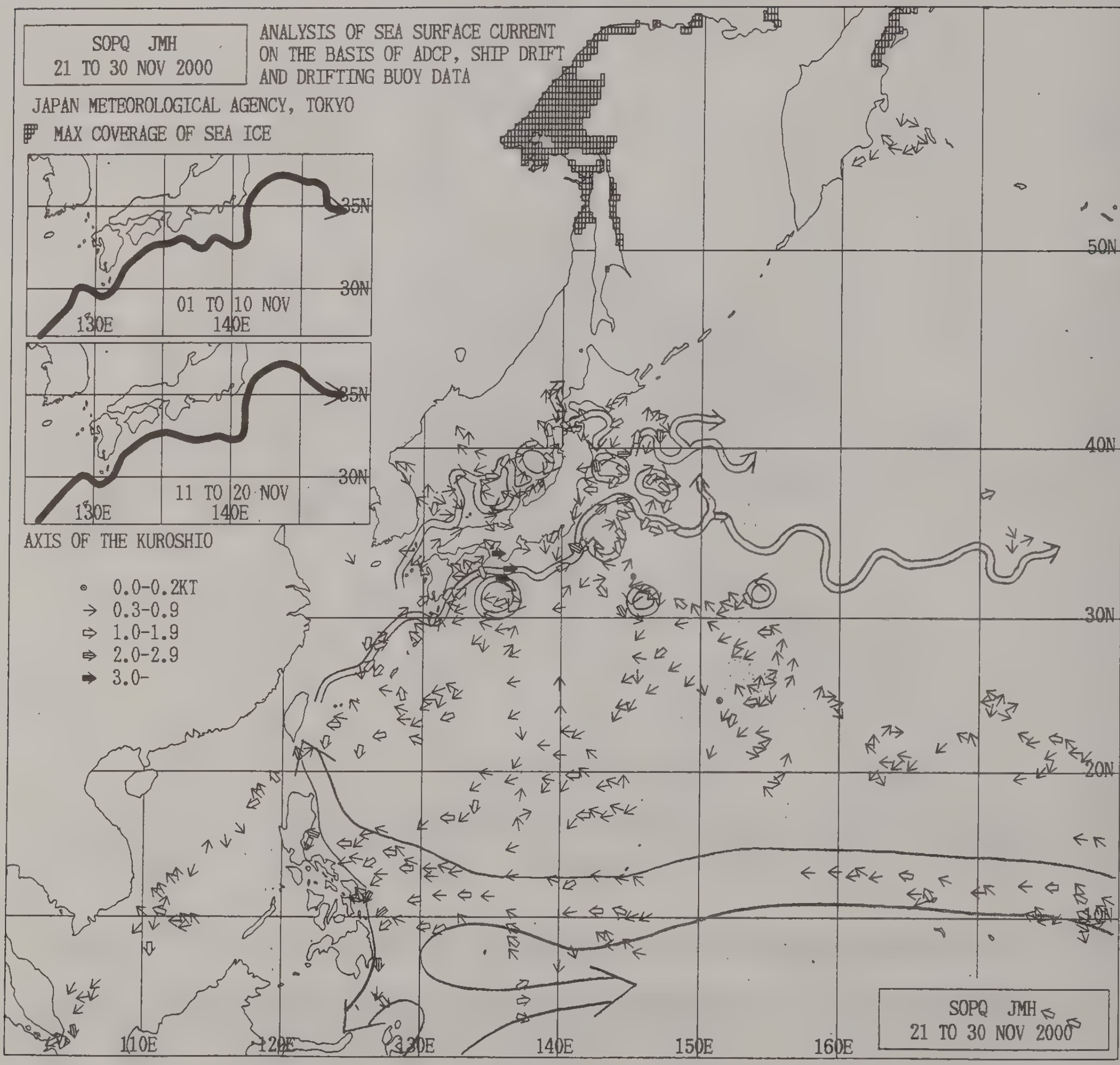
第6図　日本近海表層水温図(深さ200 m) (2000年11月)

Fig.6 Subsurface (200 m) temperatures in the seas adjacent to Japan for NOV 2000. Contour interval is 1°C. Observation points are denoted by dots.



第7図　日本近海表層水温図(深さ400 m) (2000年11月)

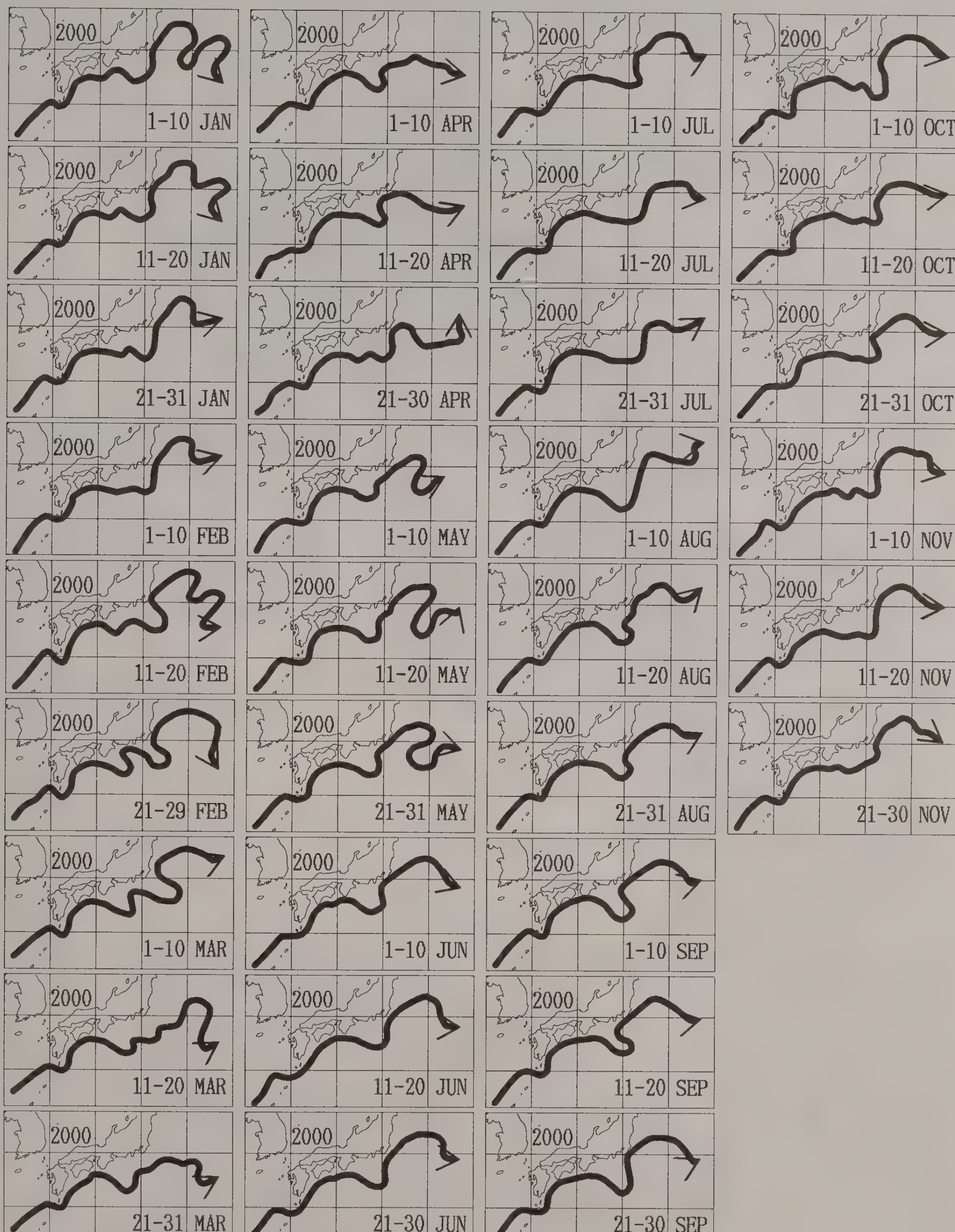
Fig.7 Subsurface (400 m) temperatures in the seas adjacent to Japan for NOV 2000. Contour interval is 1°C. Observation points are denoted by dots.



第８図　北西太平洋海流図（2000 年 11 月下旬）

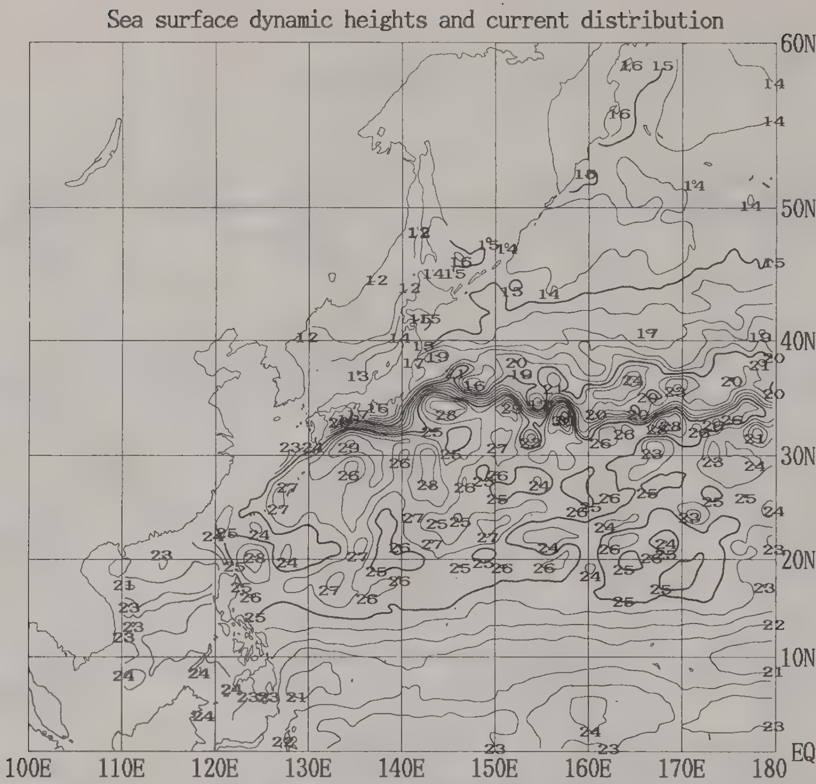
Fig. 8　Analysis of the sea surface current in the western North Pacific for the 3rd ten-day period in November 2000. Small arrows indicate *in situ* observations. Major currents such as the Kuroshio and the North Equatorial Current are denoted by larger open arrows.

Location of the Kuroshio axis



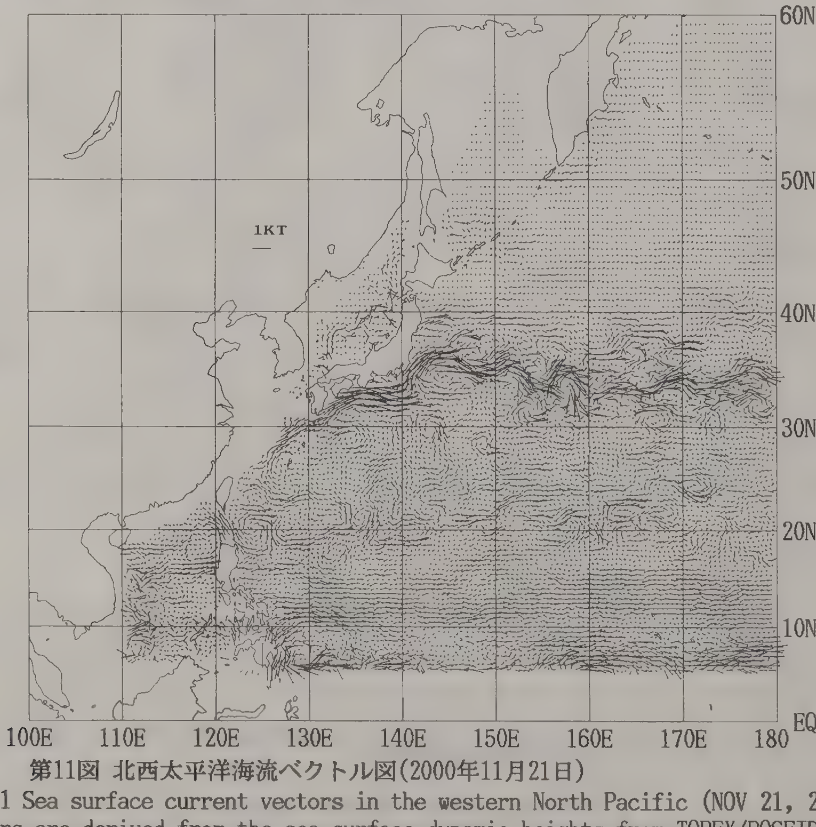
第9図 旬別黒潮流軸図

Fig.9 Location of the Kuroshio axis



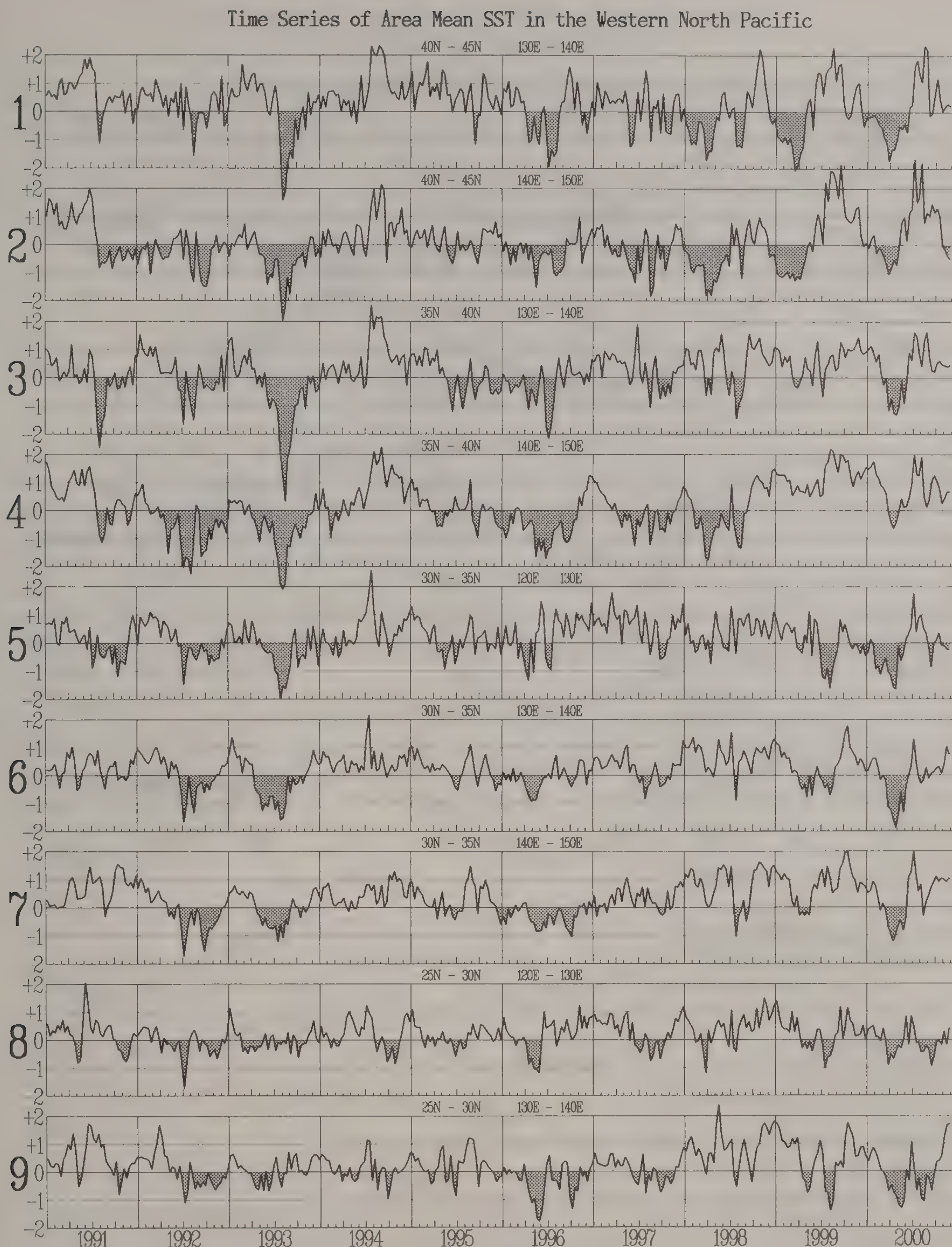
第10図 北西太平洋力学的海面高度分布図(2000年11月21日)

Fig.10 Sea surface dynamic heights (10 cm) in the western North Pacific derived from the altimeter data of TOPEX/POSEIDON (NOV 21, 2000).
1500 db surface is assumed to be the surface of no motion.



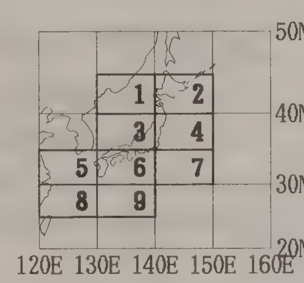
第11図 北西太平洋海流ベクトル図(2000年11月21日)

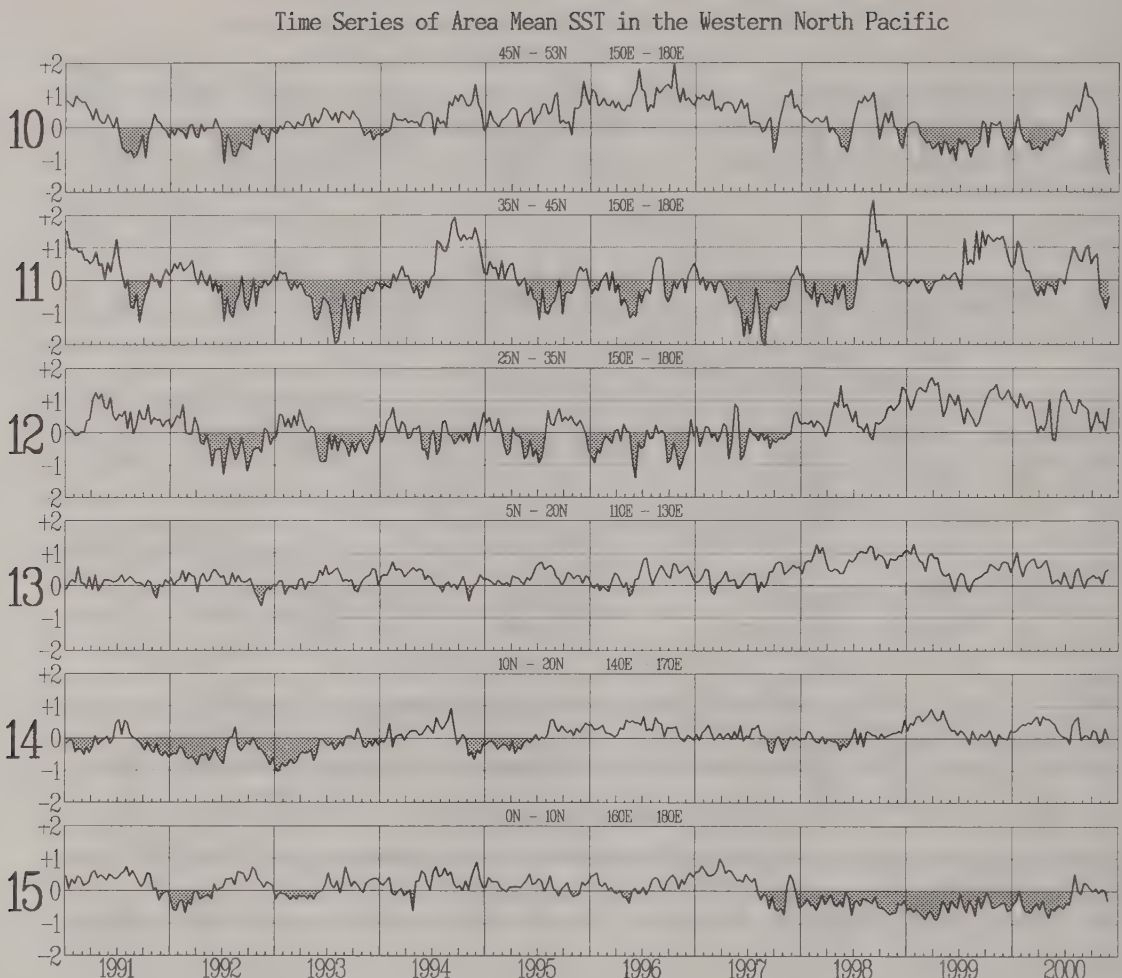
Fig.11 Sea surface current vectors in the western North Pacific (NOV 21, 2000).
Vectors are derived from the sea surface dynamic heights from TOPEX/POSEIDON and subsurface temperature distribution assuming the geostrophic relation.



第12図　海域別旬平均海面水温平年偏差時系列図

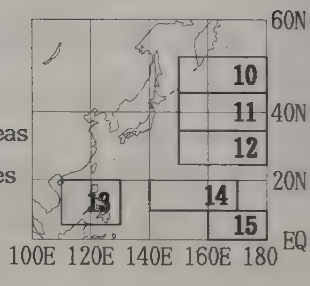
Fig.12 Time series of the ten-day mean sea surface temperature anomalies (°C) in the western North Pacific for the areas shown in the right panel. Negative anomalies are shaded. Anomalies are computed from the JMA climatology (1961-90).

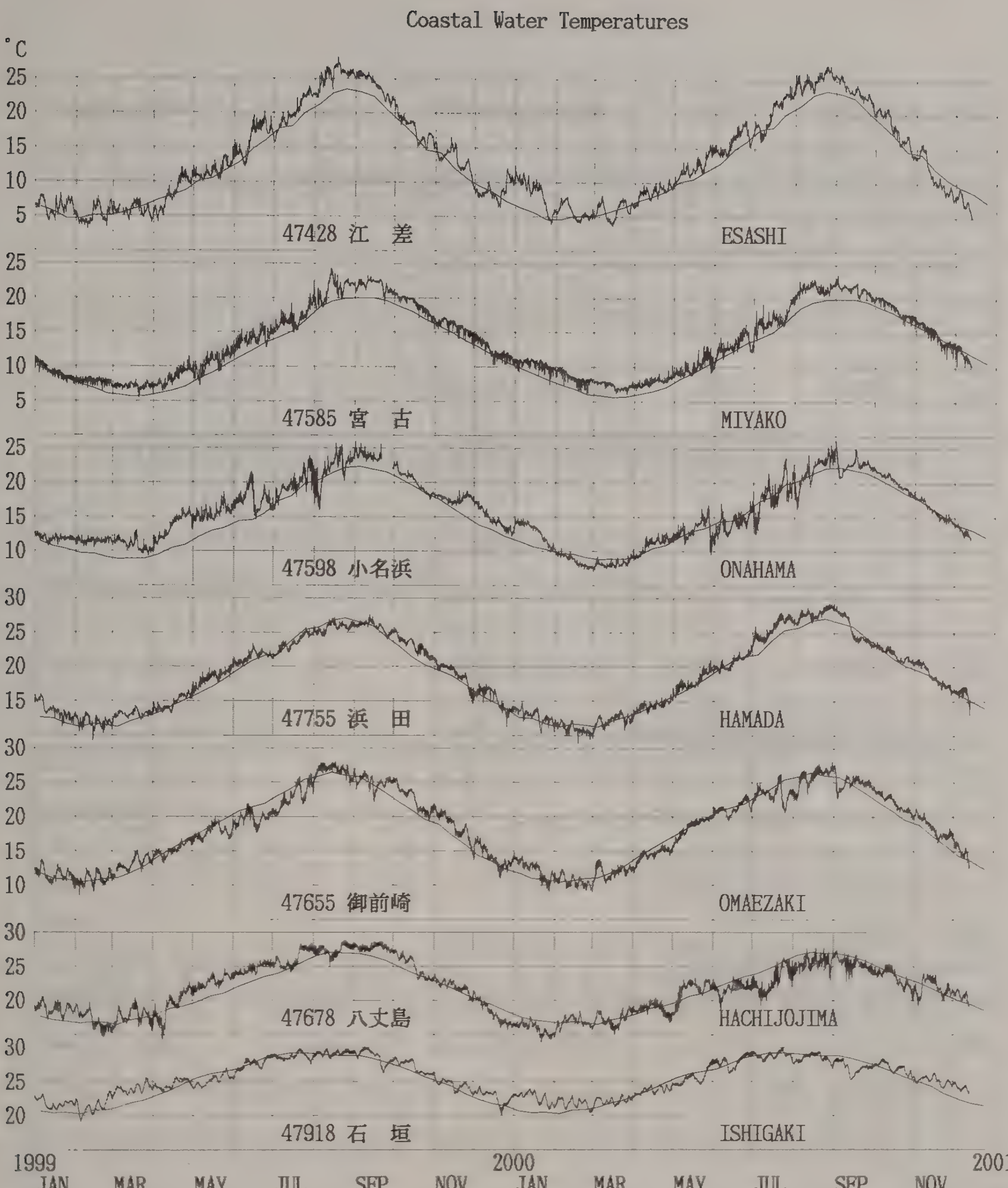




第12図　海域別旬平均海面水温平年偏差時系列図（つづき）

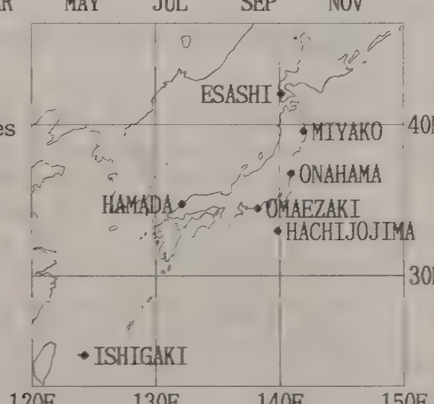
Fig.12 (continue) Time series of the ten-day mean sea surface temperature anomalies (°C) in the western North Pacific for the areas shown in the right panel. Negative anomalies are shaded. Anomalies are computed from the JMA climatology (1961-90).



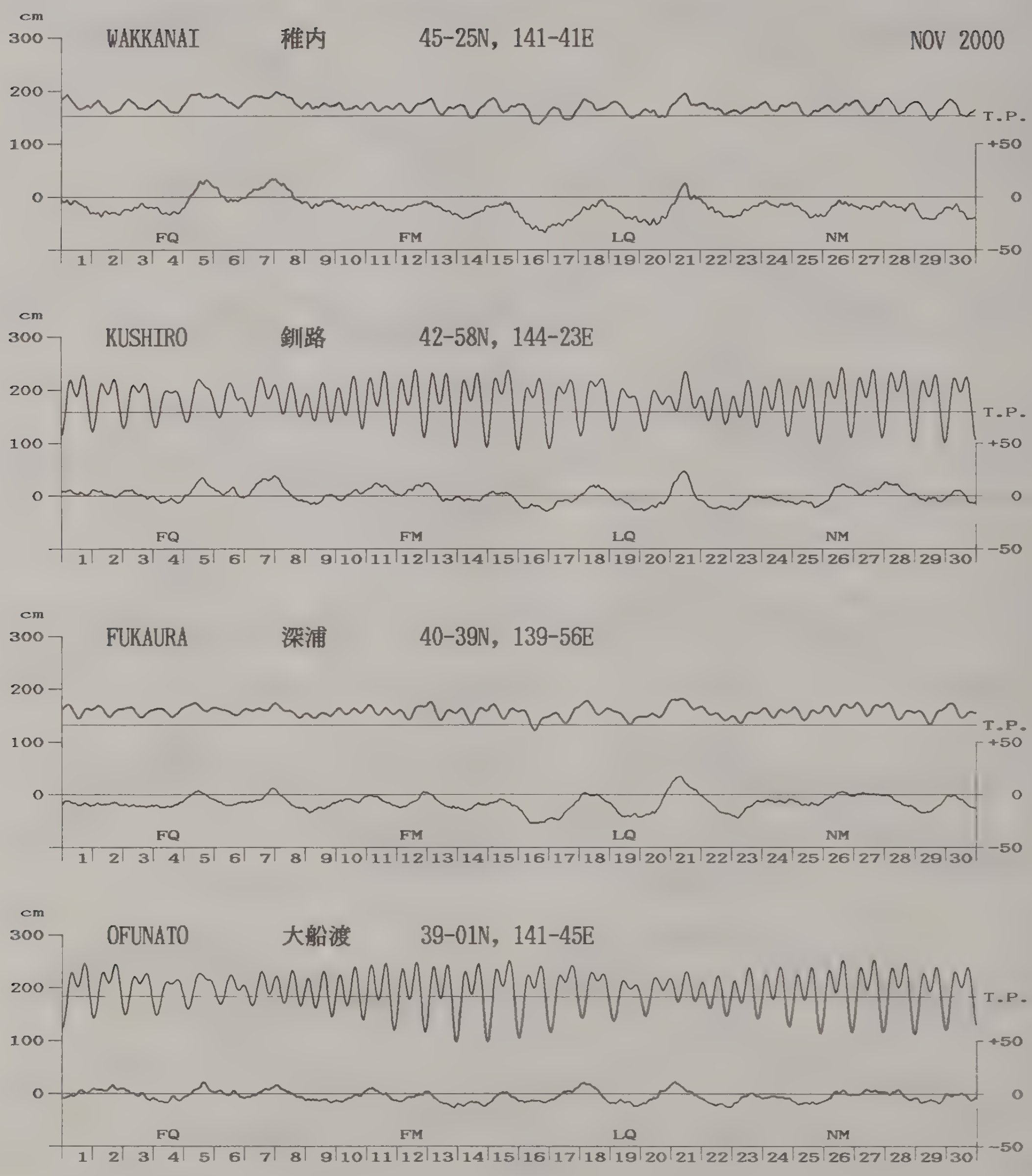


第13図 沿岸水温時系列図

Fig.13 Time series of hourly coastal water temperatures (°C) measured at 7 coastal stations of the JMA shown in the right panel.
Thin lines show ten-day mean climatology.



Time Series of Sea Level



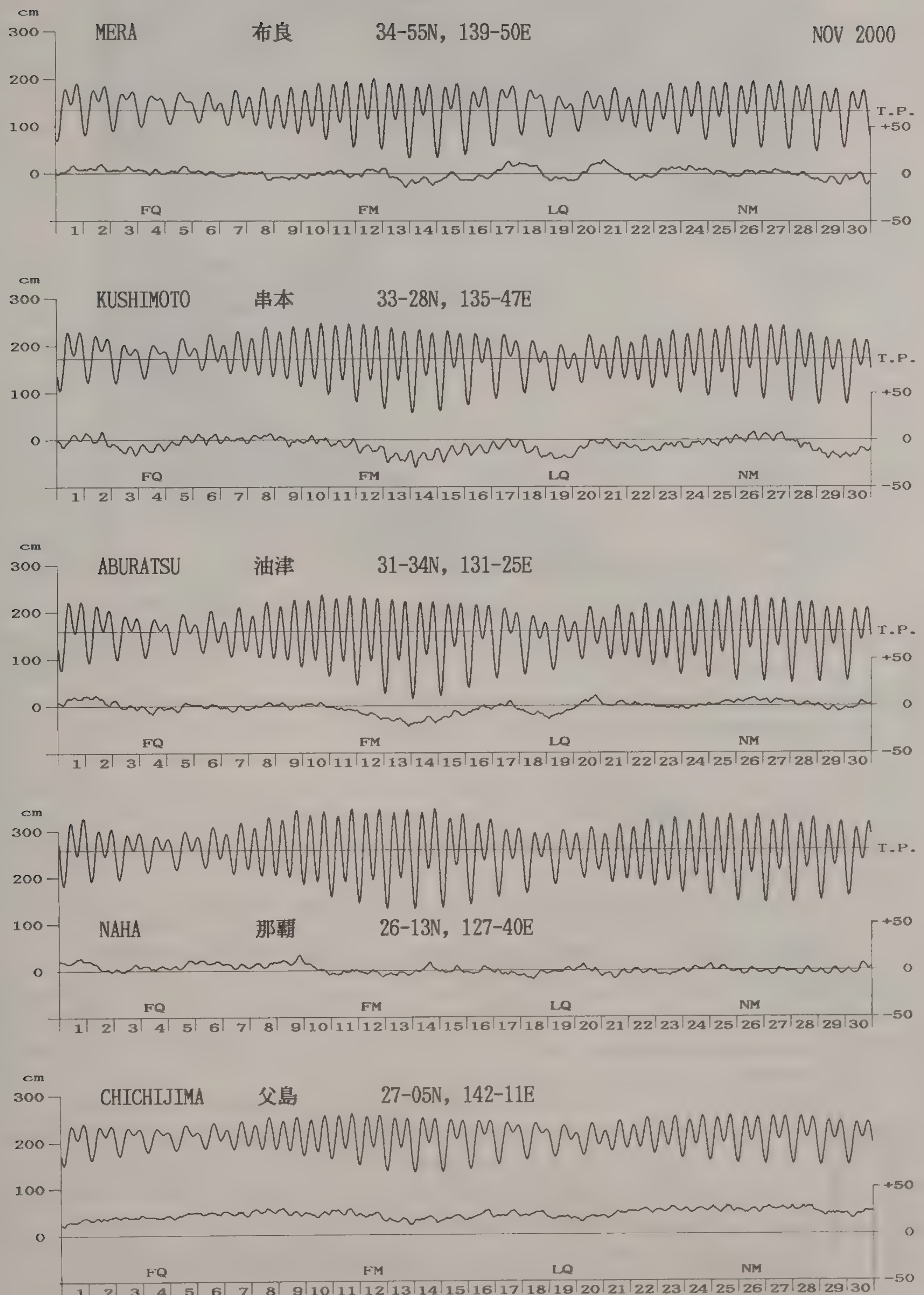
第14図 沿岸潮位時系列図（2000年11月）

Fig.14 Time series of hourly sea level observation (upper line) and its anomalies (lower line) at 9 stations of the JMA in the right panel.
Short term variations are removed from raw data.

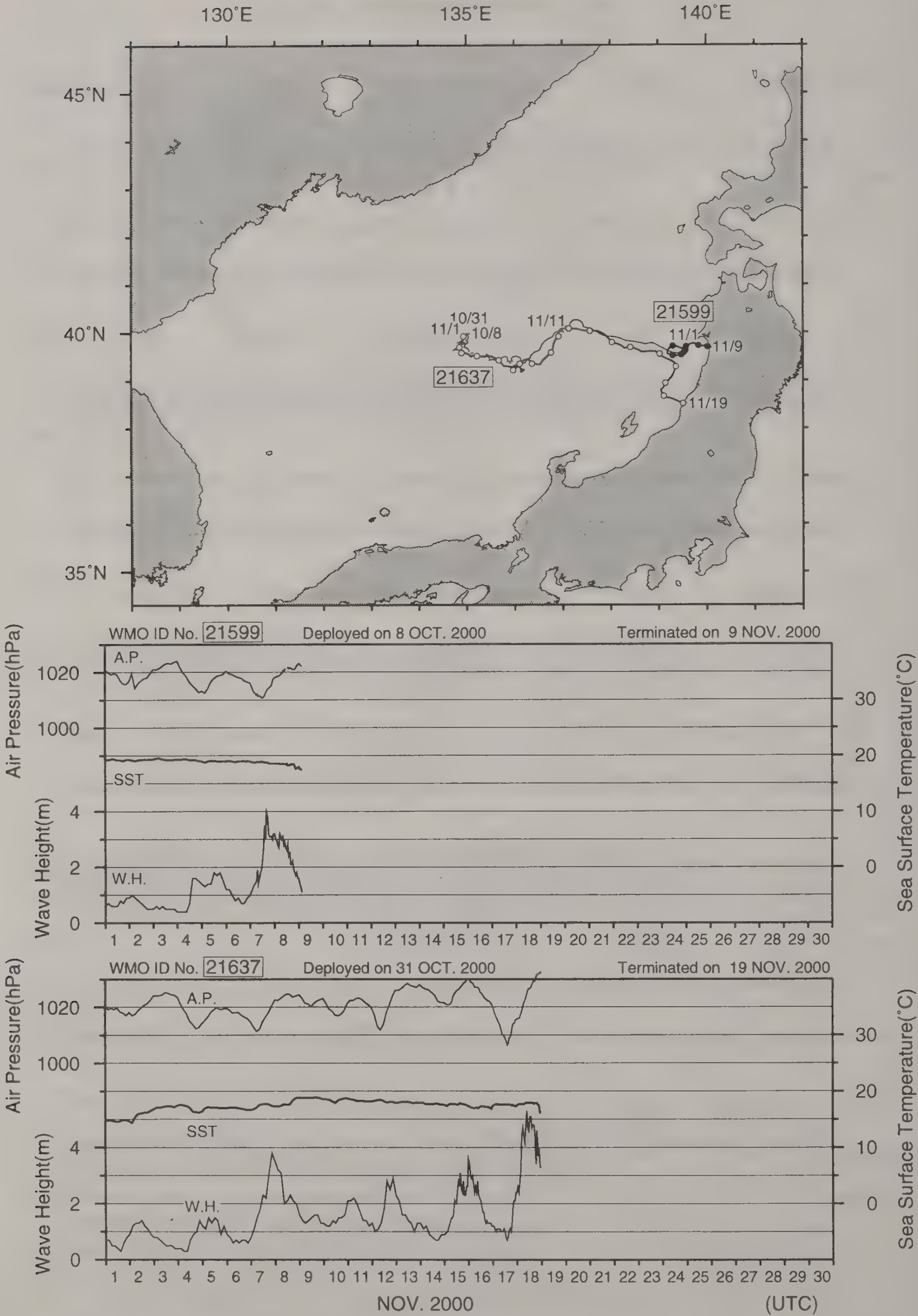
NM: new moon, FQ: first quarter
FM: full moon, LQ: last quarter
T.P.: Mean sea level of Tokyo Bay (Tokyo Peil)



Time series of Sea Level

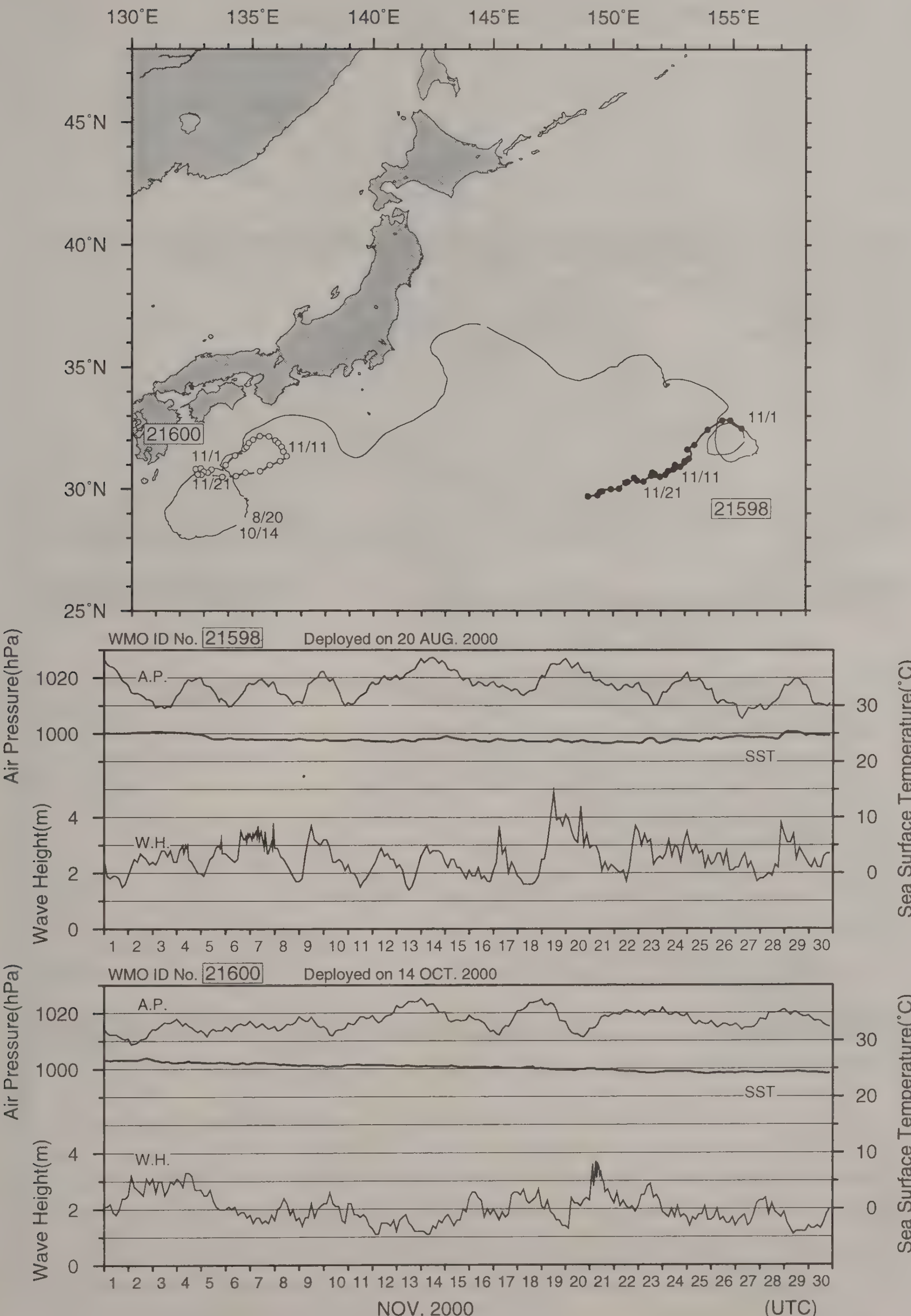


第14図 つづき
Fig.14 continue



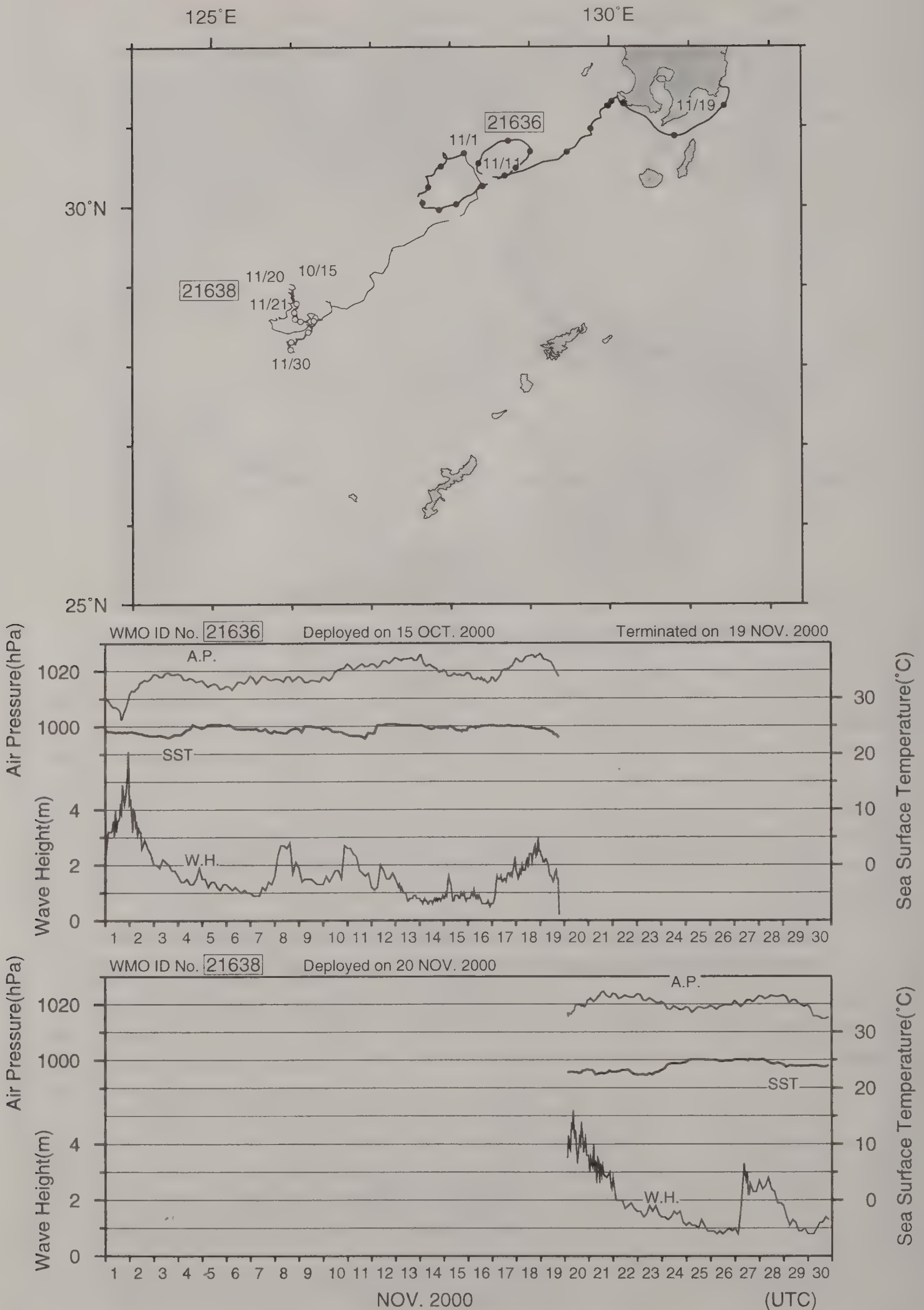
第15-1図　漂流型海洋気象ブイロボットの軌跡と観測要素の時系列図（日本海）

Fig.15-1　Time series of JMA drifting buoy observation in the Japan Sea.
The upper panel shows paths of the buoys. Circles denote the position at 00h UTC everyday.
The lower panel shows time series of observation data.



第15-2図　漂流型海洋気象ブイロボットの軌跡と観測要素の時系列図

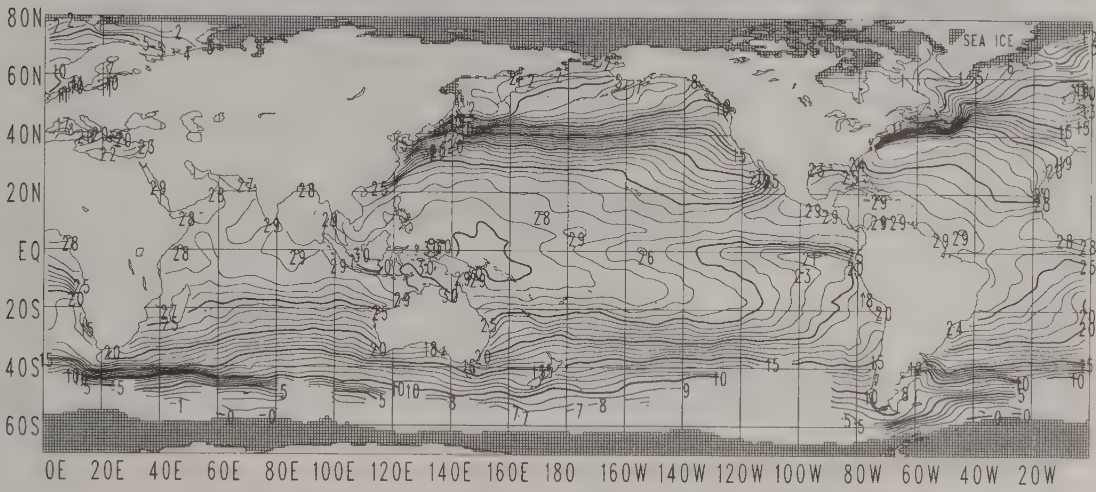
Fig.15-2　Time series of JMA drifting buoy observation.
The upper panel shows paths of the buoys. Circles denote the position at 00h UTC everyday.
The lower panel shows time series of observation data.

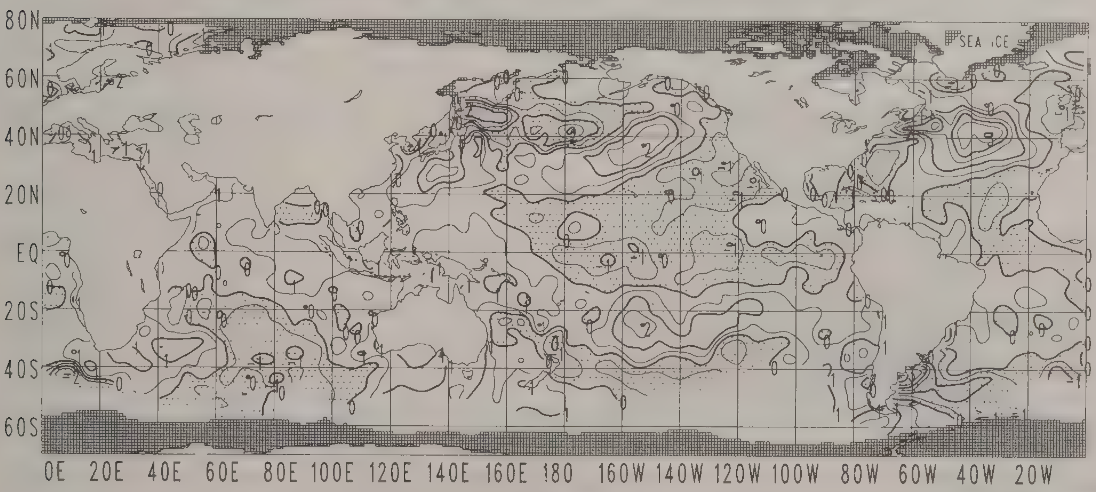


第15-3図　　漂流型海洋気象ブイロボットの軌跡と観測要素の時系列図（東シナ海）

Fig.15-3　　Time series of JMA drifting buoy observation in the East China Sea.
The upper panel shows paths of the buoys. Circles denote the position at 00h UTC everyday.
The lower panel shows time series of observation data.

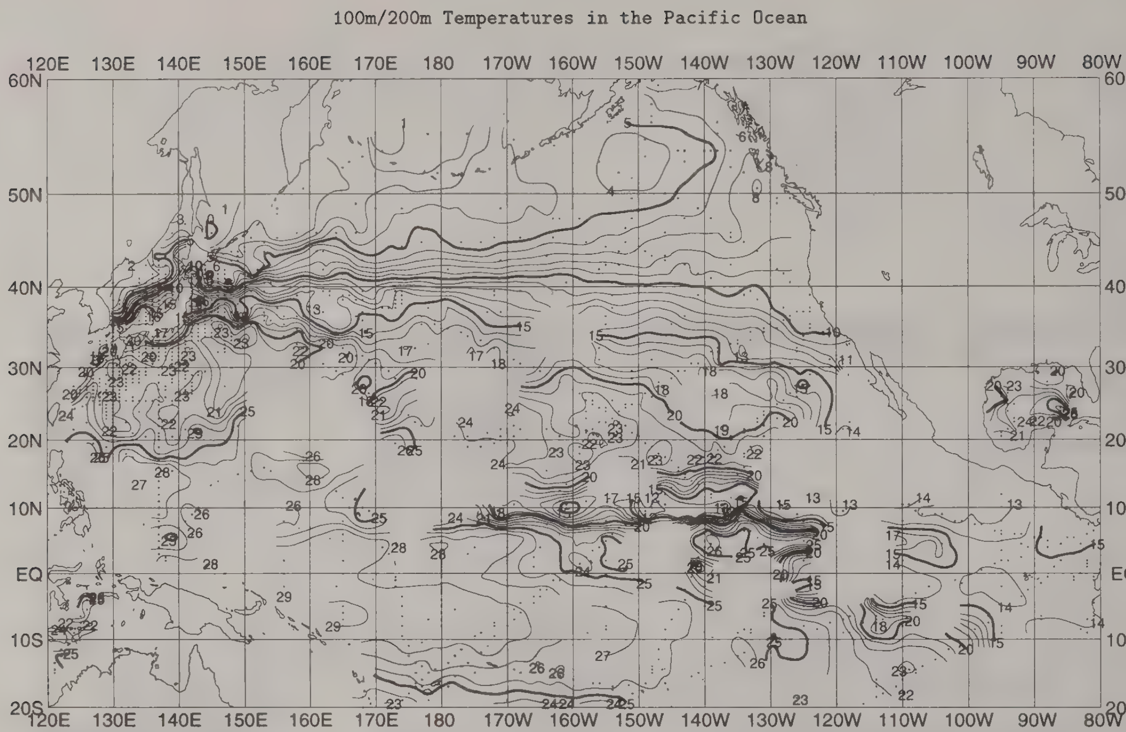
SST & Anomalies in the Global Ocean





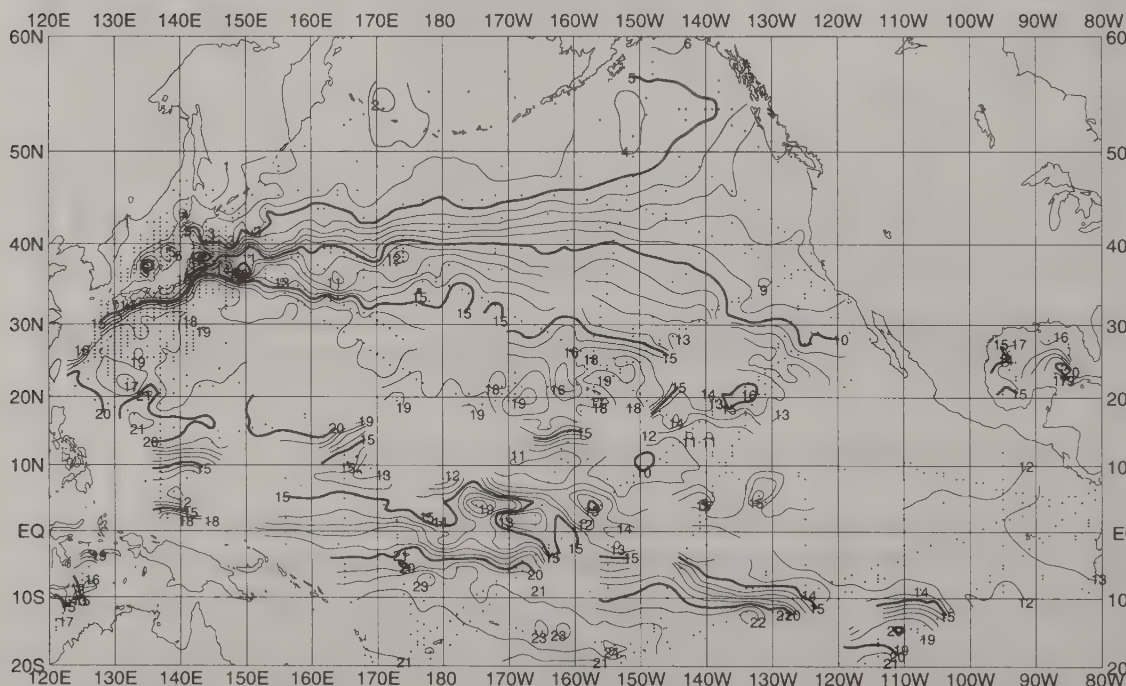
第16図　全球月平均海面水温図（上）及び偏差図（下）（2000年11月）

Fig.16 Monthly mean sea surface temperature over the global ocean (top) and anomalies (bottom) for NOV 2000. Anomalies are computed from the JMA climatology (1961-1990). Contour interval is 1°C (top) and additional anomaly contours of ±0.5°C are shown by thin lines. Negative anomalies are spotted. Maximum coverage of sea ice is shaded. Data sources for sea ice are U.S. National Ice Center (polar regions) and JMA (the Sea of Okhotsk).



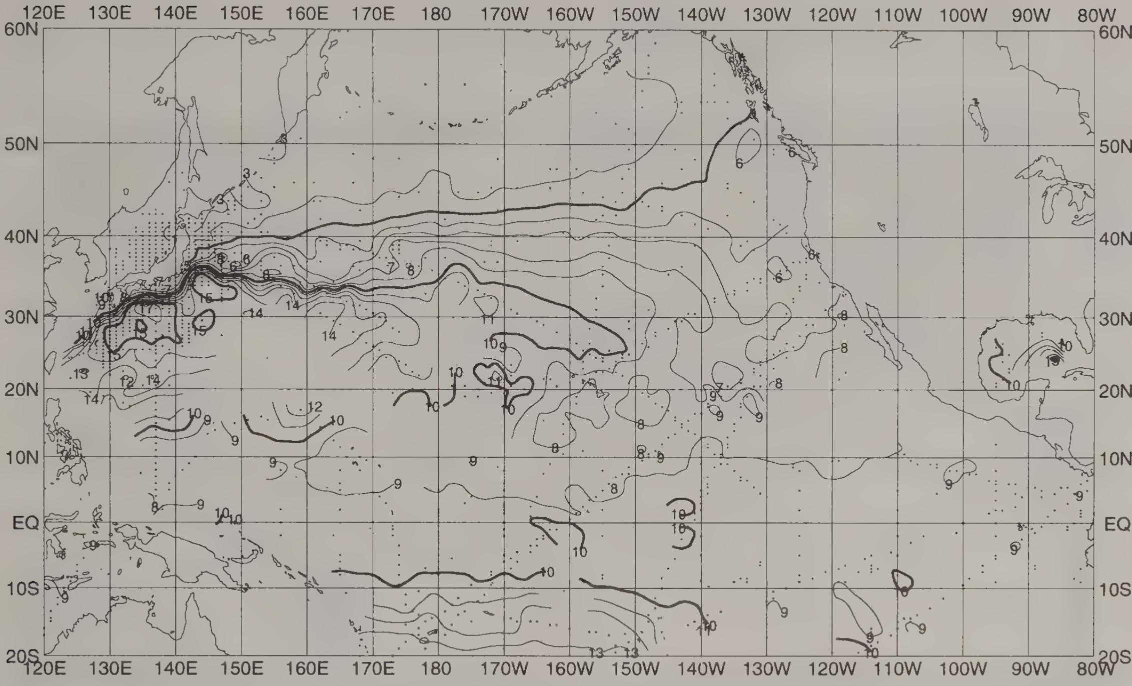
第 17 図　太平洋表層水温図（深さ 100 m）　(2000 年 11 月)

Fig. 17　Subsurface (100 m) temperatures in the Pacific Ocean for November 2000. Contour interval is 1 ℃. Observation points are denoted by dots.



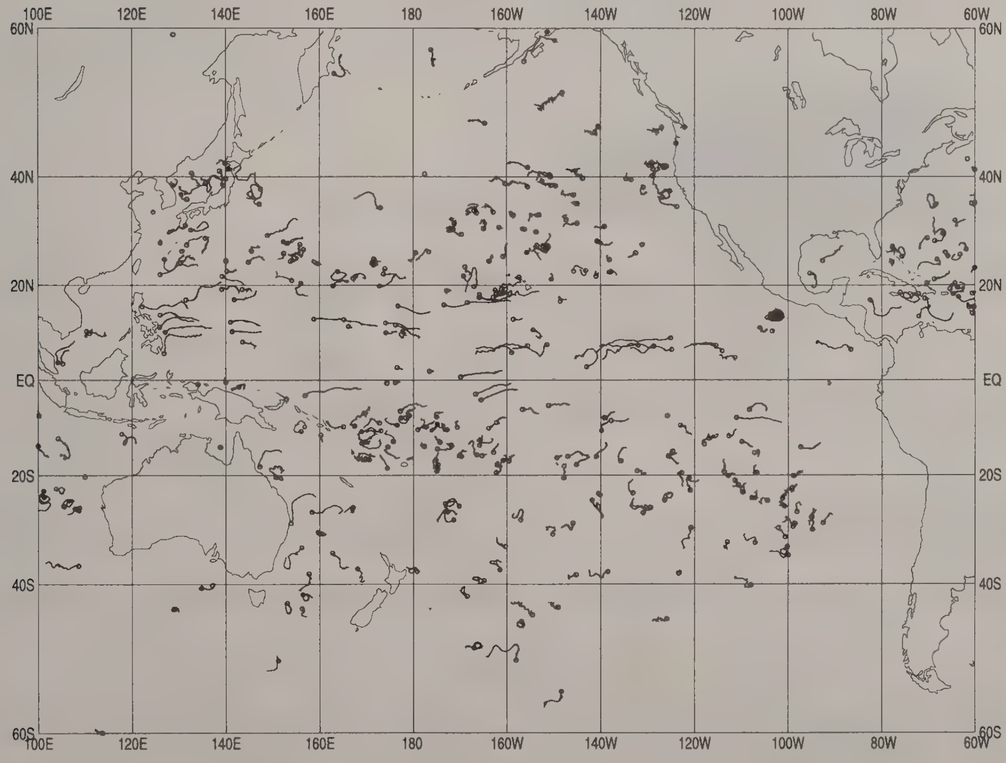
第 18 図　太平洋表層水温図（深さ 200 m）　(2000 年 11 月)

Fig. 18　Subsurface (200 m) temperatures in the Pacific Ocean for November 2000. Contour interval is 1 ℃. Observation points are denoted by dots.



第 19 図　太平洋表層水温図（深さ 400 m）（2000 年 11 月）

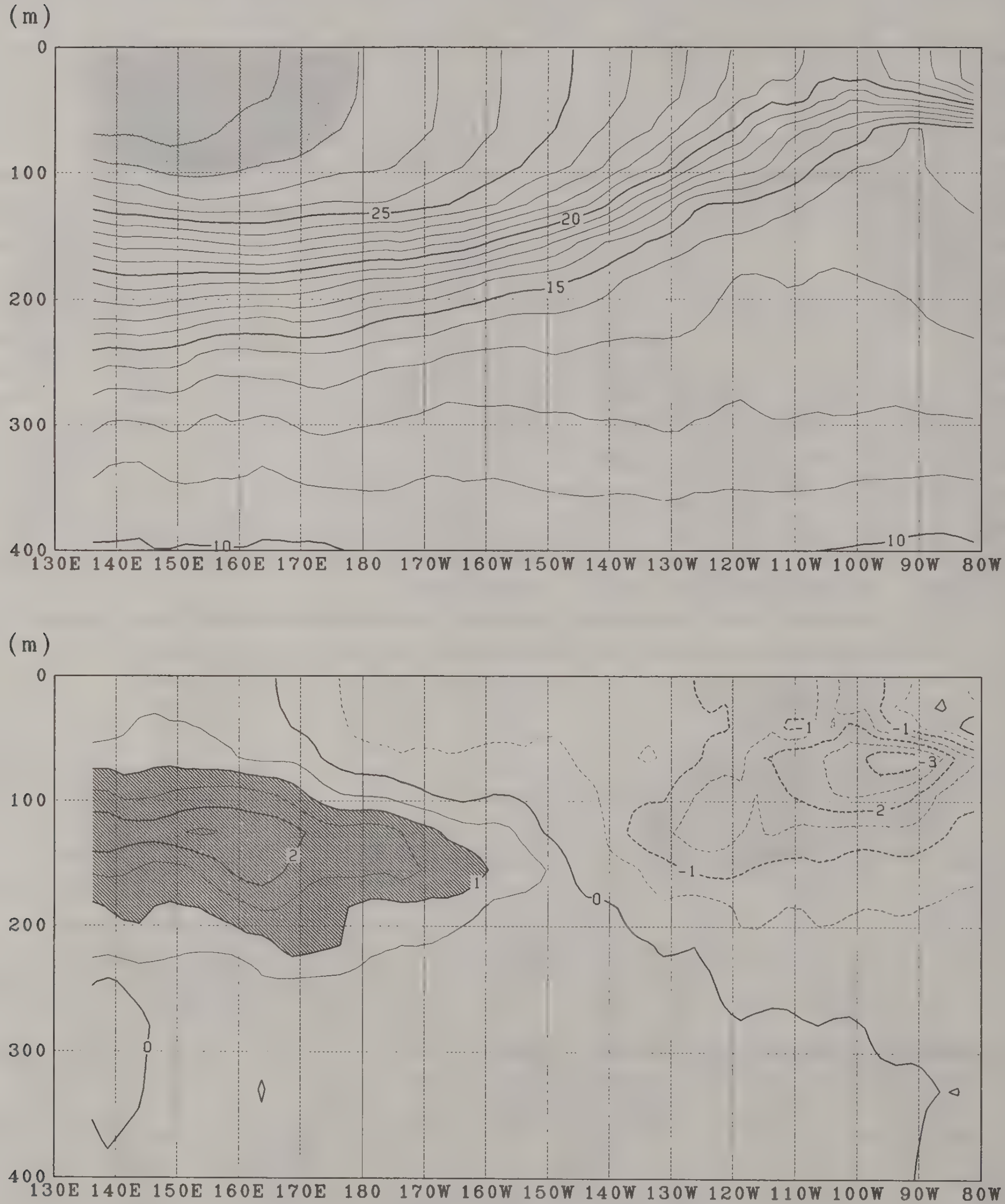
Fig. 19　Subsurface (400 m) temperatures in the Pacific Ocean for November 2000. Contour interval is 1 ℃. Observation points are denoted by dots.



第 20 図　太平洋ブイ流跡図（2000 年 11 月）

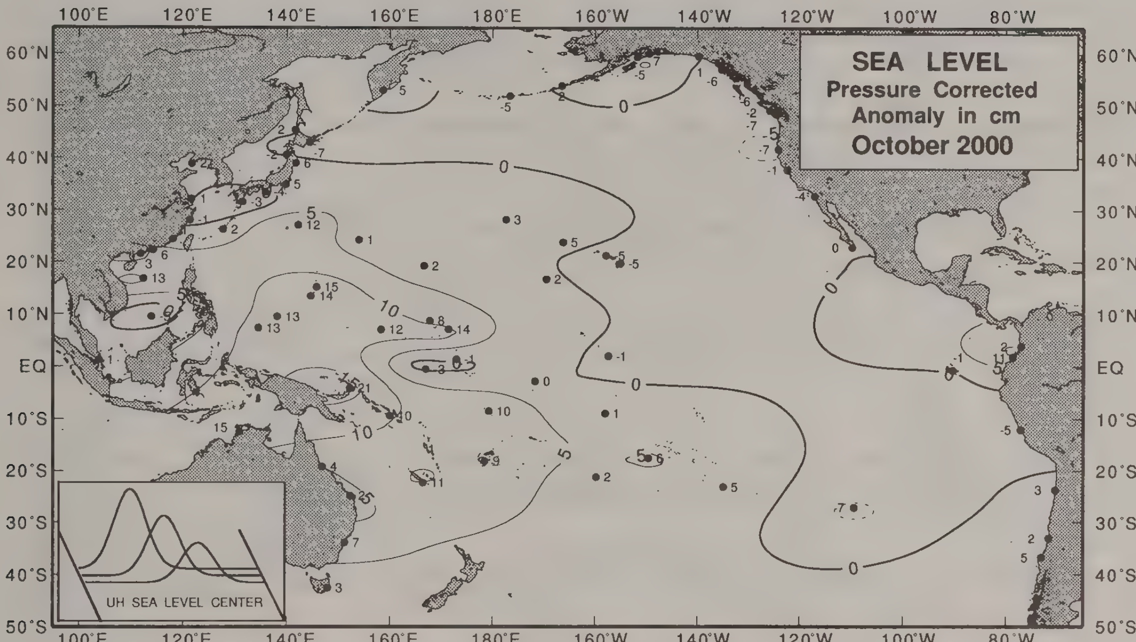
Fig. 20　Movements of drifting buoys in the Pacific Ocean during November 2000. Each track is for one buoy. Small circles represent the last positions for the month.

Depth-Longitude Sections of Equatorial Temperature & Anomalies



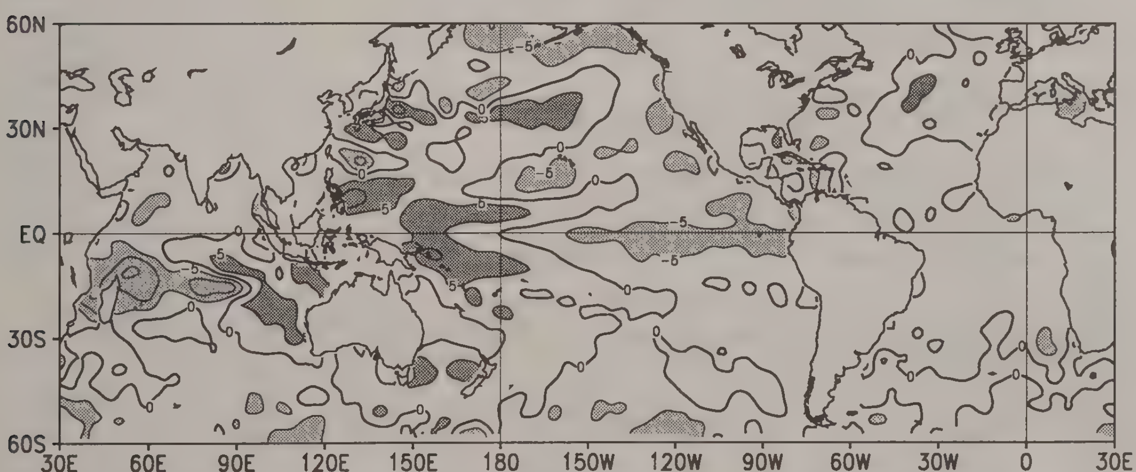
第21図　太平洋赤道に沿う表層水温（上）及び偏差（下）の深度－経度断面図（2000年11月）

Fig.21 Depth-longitude sections of temperature (top) and anomalies (bottom) along the equator in the Pacific Ocean for NOV 2000. Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C (top) and 0.5°C (bottom). Values greater than 28°C in the top panel are shaded. In the bottom panel, values greater than 1°C are shaded and values less than -1°C are spotted. Anomalies are computed from 1987-1999 base period means.



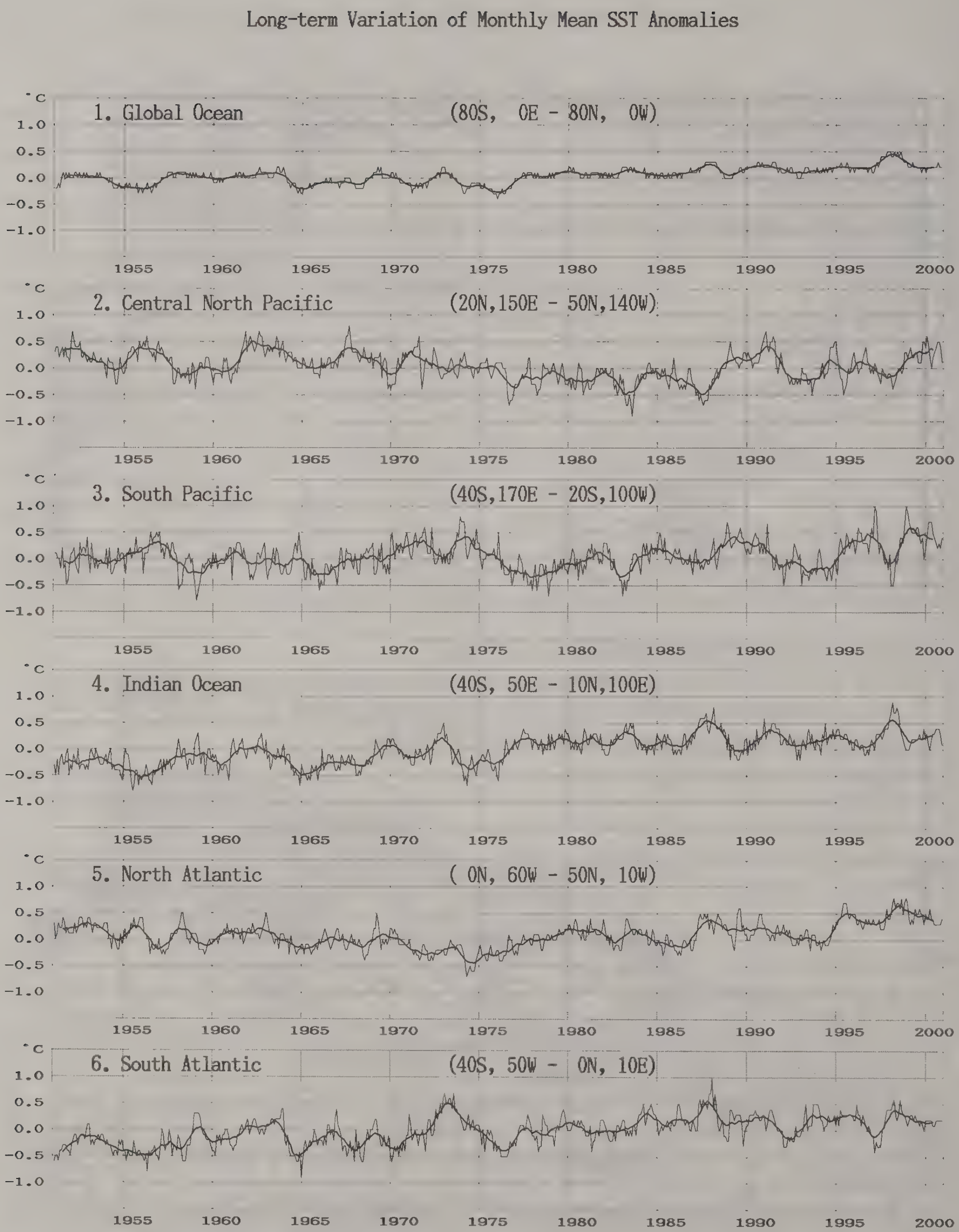
第 22 図　太平洋月平均海面水位偏差図 (2000 年 10 月)

Fig. 22　Monthly sea level anomalies for October 2000 obtained from mean sea level (1975-1995) adjusted for atmospheric pressure. This figure is prepared by the SOC of ISLP-PAC, Department of Oceanography, University of Hawaii.



第 23 図　全球月平均海面高度偏差図 (2000 年 10 月)

Fig. 23　Monthly sea surface height anomalies in the global ocean derived from the altimeter data of TOPEX/POSEIDON for October 2000. Contour interval is 5 cm. Positive anomalies exceeding +5 cm are shaded and negative anomalies exceeding -5 cm are spotted. Anomalies are computed from 1993-1998 base period means.

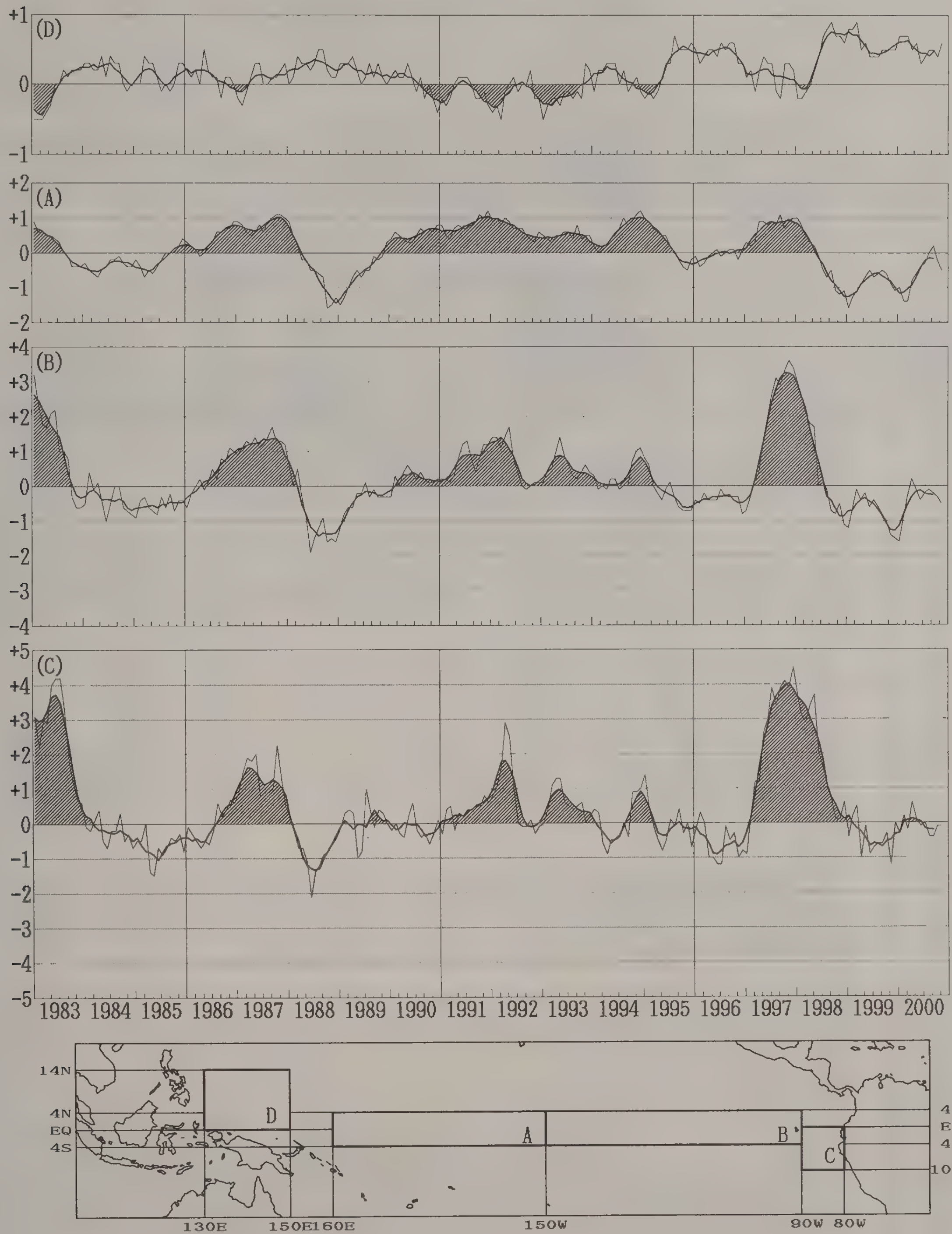


第24図 海域平均海面水温偏差の長期変動

Fig.24 Long-term variations of monthly mean sea surface temperature anomalies (°C) for the areas shown in the right panel. Anomalies are computed from the JMA climatology (1961-90). Thin lines show the monthly mean and thick lines their 13-month running means.



Time Series of Equatorial Pacific SST Anomalies



第25図　太平洋赤道域の海面水温偏差時系列図

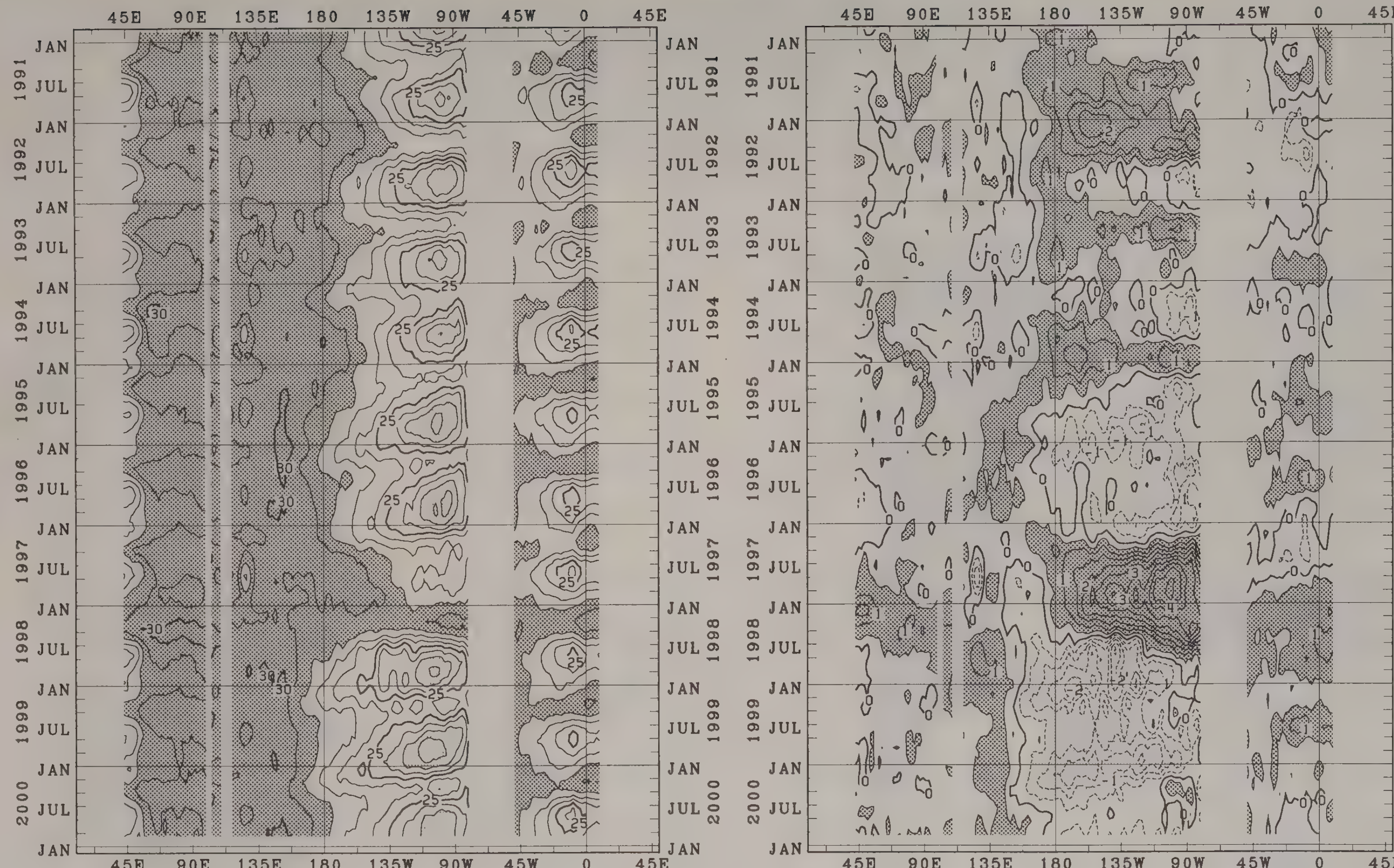
Fig.25 Time series of monthly mean SST anomalies (°C) in the equatorial Pacific Ocean for the areas indicated at the bottom panel. Thin lines show the monthly means and thick lines their 5-month running means. Positive anomalies (A, B, C) and negative anomalies (D) are shaded. Anomalies are computed from the JMA climatology (1961-1990).

El Nino Monitoring Indices

MONTH YEAR	SEA SURFACE TEMPERATURE AND ANOMALY (°C): REGION D 14N-EQ 130E-150E		REGION A 4N-4S 160E-150W		REGION B 4N-4S 150W-90W		REGION C EQ-10S 90W-80W		SOI	SEA LEVEL PRESSURE ANOMALY (hPa): TAHITI 17-33S 149-37W	DARWIN 12-24S 130-52E
JAN 98	28.3	-0.2	29.0	1.0	28.4	3.0	28.0	3.7	-2.3	-3.6	1.4
FEB 98	28.1	-0.2	28.8	0.8	28.8	2.6	28.8	3.1	-1.8	-0.9	3.5
MAR 98	28.3	-0.1	28.6	0.5	29.0	2.1	28.8	2.9	-2.5	-2.8	2.3
APR 98	28.8	0.0	28.5	0.3	28.9	1.8	28.5	3.4	-2.3	-1.5	1.4
MAY 98	29.3	0.2	28.7	0.2	28.3	1.7	27.6	3.7	0.0	0.4	0.5
JUN 98	29.7	0.4	28.4	-0.1	26.1	0.0	24.7	2.0	1.1	0.9	-0.5
JUL 98	29.9	0.7	28.0	-0.5	25.3	0.1	23.2	1.6	1.5	1.8	-0.6
AUG 98	29.9	0.8	27.7	-0.7	24.5	-0.1	21.7	1.1	1.0	1.4	-0.2
SEP 98	30.1	0.9	27.8	-0.5	23.9	-0.7	21.0	0.7	1.0	1.4	-0.4
OCT 98	30.0	0.7	27.3	-1.1	23.8	-0.8	20.8	0.1	1.2	0.8	-1.1
NOV 98	29.9	0.7	27.2	-1.2	24.1	-0.5	21.6	0.1	1.0	0.4	-1.5
DEC 98	29.5	0.6	27.1	-1.1	23.8	-1.1	23.2	0.6	1.5	1.1	-1.5
JAN 99	29.3	0.8	26.4	-1.6	24.2	-1.2	23.9	-0.4	1.5	1.8	-1.5
FEB 99	29.1	0.8	26.7	-1.3	25.5	-0.7	25.9	0.2	0.8	1.3	-0.6
MAR 99	29.3	0.9	27.0	-1.1	26.8	-0.1	26.4	0.5	0.8	0.4	-1.3
APR 99	29.3	0.5	27.3	-0.9	26.7	-0.4	24.1	-1.0	1.8	1.3	-0.9
MAY 99	29.7	0.6	27.8	-0.7	26.4	-0.2	23.8	-0.1	0.3	1.1	1.1
JUN 99	29.7	0.4	28.0	-0.5	25.5	-0.6	21.8	-0.9	0.1	0.6	0.4
JUL 99	29.6	0.4	27.8	-0.7	24.8	-0.4	20.9	-0.7	0.5	1.0	0.1
AUG 99	29.5	0.4	27.8	-0.6	24.0	-0.6	20.0	-0.6	0.0	1.3	1.1
SEP 99	29.7	0.5	27.8	-0.5	23.8	-0.8	19.7	-0.6	-0.1	0.2	0.4
OCT 99	29.8	0.5	27.8	-0.6	23.6	-1.0	20.4	-0.3	1.1	1.2	-0.4
NOV 99	29.7	0.5	27.5	-0.9	23.2	-1.4	20.3	-1.2	1.1	1.2	-0.9
DEC 99	29.4	0.5	27.1	-1.1	23.4	-1.5	22.6	0.0	1.5	1.9	-0.9
JAN 00	29.2	0.7	27.0	-1.0	23.8	-1.6	24.0	-0.3	0.4	1.3	0.3
FEB 00	29.0	0.7	26.6	-1.4	25.3	-0.9	25.9	0.2	1.1	2.6	-0.2
MAR 00	29.1	0.7	26.7	-1.4	26.6	-0.3	25.7	-0.2	1.0	1.6	-0.3
APR 00	29.3	0.5	27.4	-0.8	27.3	0.2	25.7	0.6	1.4	0.8	-1.0
MAY 00	29.7	0.6	27.9	-0.6	26.5	-0.1	24.0	0.1	0.3	0.8	0.7
JUN 00	29.6	0.3	28.1	-0.4	25.7	-0.4	22.6	-0.1	-0.6	0.2	0.9
JUL 00	29.6	0.4	28.2	-0.3	25.0	-0.2	21.6	0.0	-0.3	-0.4	0.0
AUG 00	29.6	0.5	28.4	0.0	24.5	-0.1	20.2	-0.4	0.5	0.2	-0.6
SEP 00	29.7	0.5	28.5	0.2	24.4	-0.2	19.9	-0.4	0.9	1.6	-0.0
OCT 00	29.7	0.4	28.2	-0.2	24.3	-0.3	20.6	-0.1	0.9	0.2	-1.5
NOV 00	29.8	0.6	27.9	-0.5	24.1	-0.5	21.4	-0.1	1.9	1.2	-2.4

第1表　エルニーニョ監視指数

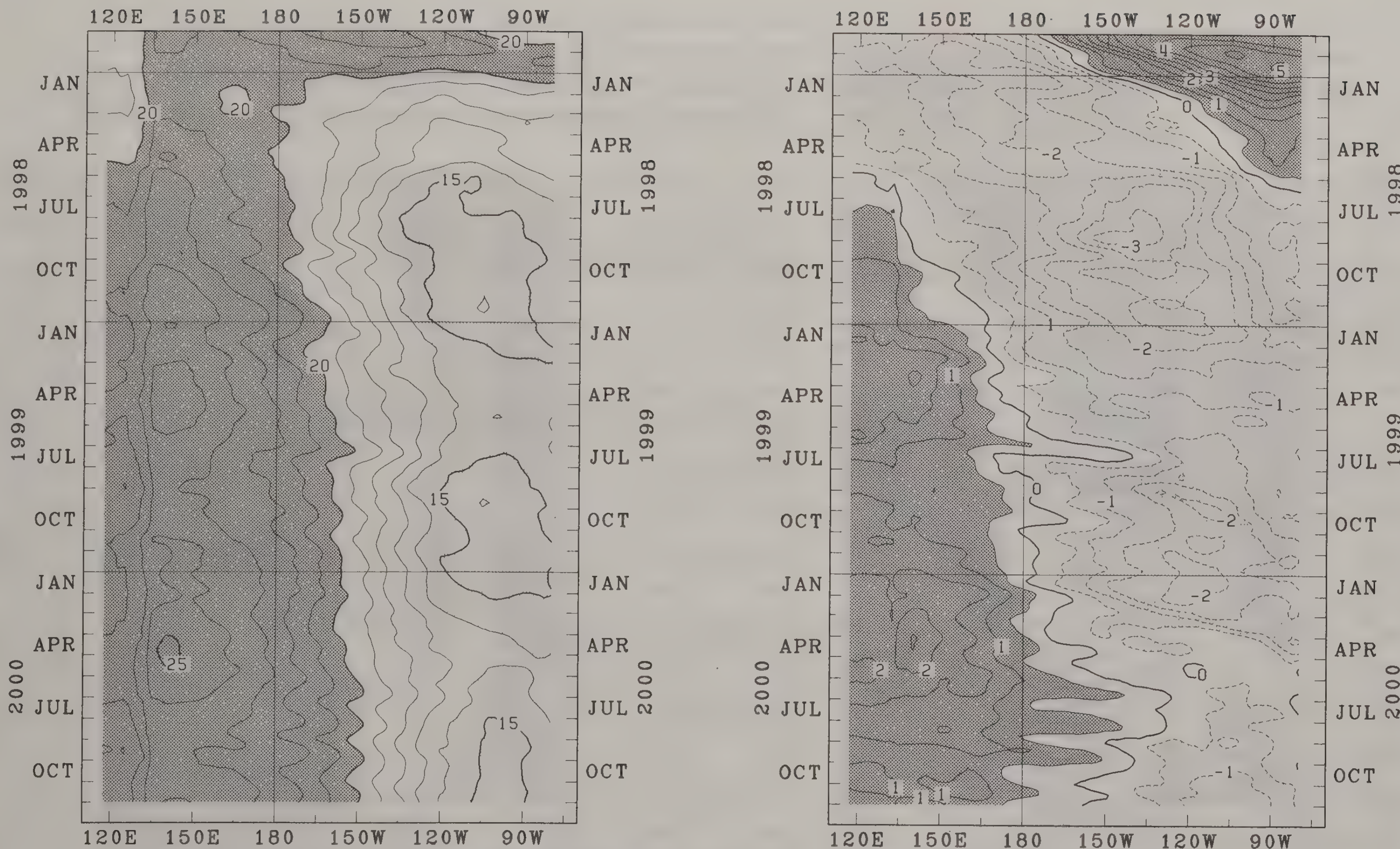
Table 1 El Nino Monitoring indices



第 26 図　赤道に沿った海面水温（左）及び偏差（右）の時間-経度断面図

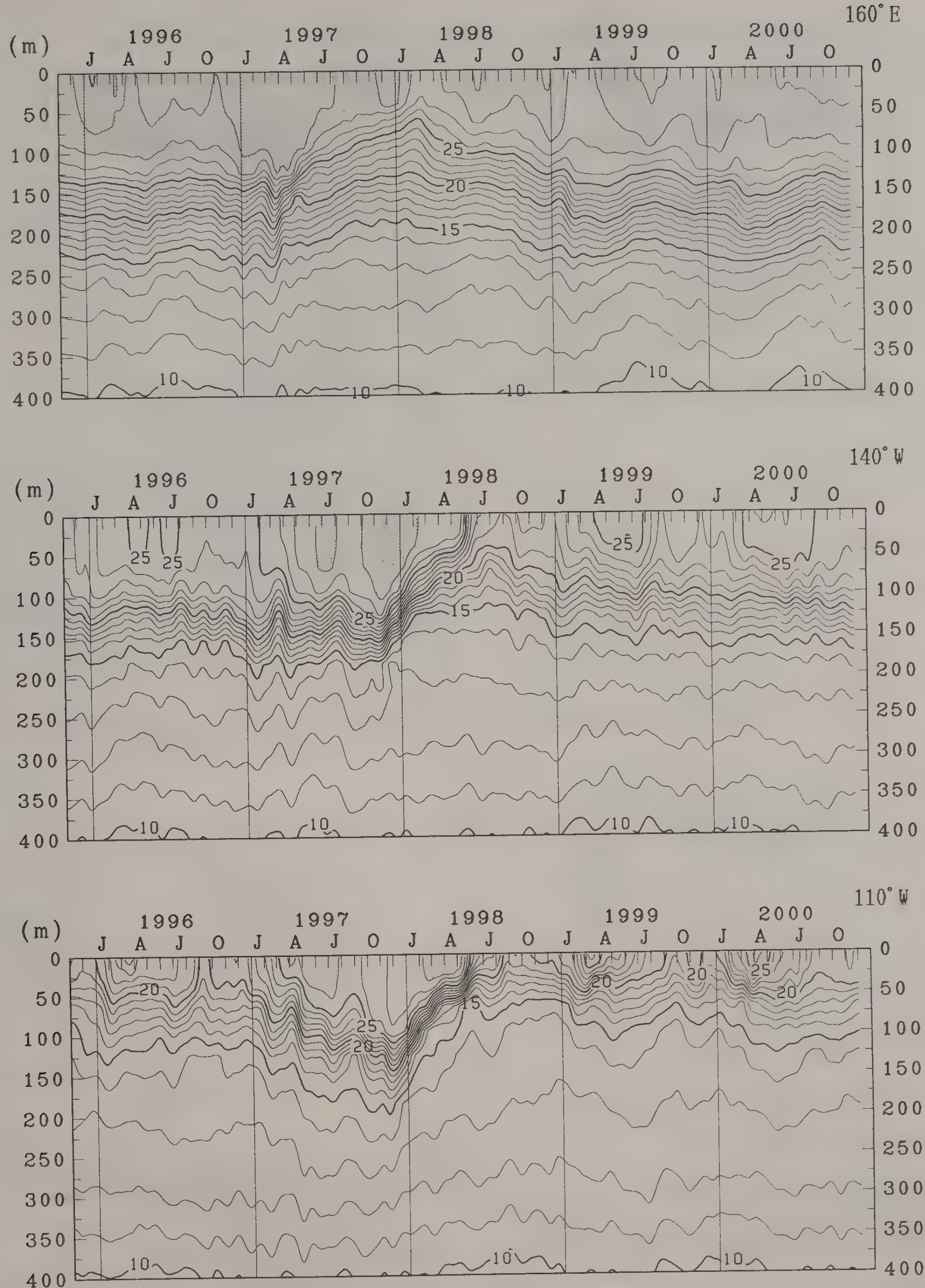
Fig. 26　Time-longitude sections of SSTs (left) and anomalies (right) along the equator (2 °N-2 °S) in the global ocean. Contour interval is 1 ℃ (left) and 0.5 ℃ (right). Values greater than 28 ℃ are shaded and values less than 23 ℃ are spotted in the left panel. Dashed contours indicate negative anomalies in the right panel. Anomalies are computed from 1961-1990 base period means.

Time-Longitude Sections of Ocean Heat Content & Anomalies (Eq.)



第27図　太平洋の赤道に沿う海洋表層の貯熱量（左）及び偏差（右）の時間－経度断面図

Fig.27 Time-longitude sections of ocean heat content in the upper 260 m along the equator (left) and anomalies (right) in the Pacific Ocean. Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C (left) and 0.5°C (right). Values greater than 20°C are shaded and values less than 16°C are spotted in the left panel. Dashed contours indicate negative anomalies in the right panel. Anomalies are computed from 1987-1999 base period means.



第28図　太平洋赤道域の表層水温の時間－深度断面図

(上：西部、中：中部、下：東部)

Fig.28 Time-depth sections of equatorial subsurface temperature for the western Pacific (top, 160°E), the central Pacific (middle, 140°W) and the eastern Pacific (bottom, 110°W). Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C. Values greater than 28°C are shaded.

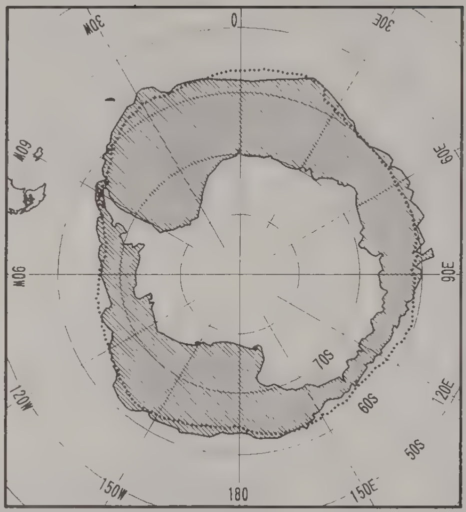


第29-1図　北極域の海氷図（2000年11月17日）

Fig.29-1 Sea ice chart in the Arctic on 17 Nov. 2000.

The shaded area represents the sea ice extent. The dotted line denotes the mean ice edge averaged for the period from 1972 through 1990.

The data source is the National Ice Center (USA).

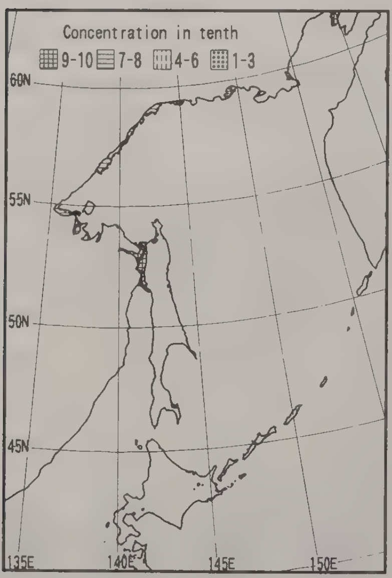


第29-2図　南極域の海氷図（2000年11月17日）

Fig.29-2 Sea ice chart in the Antarctic on 17 Nov. 2000.

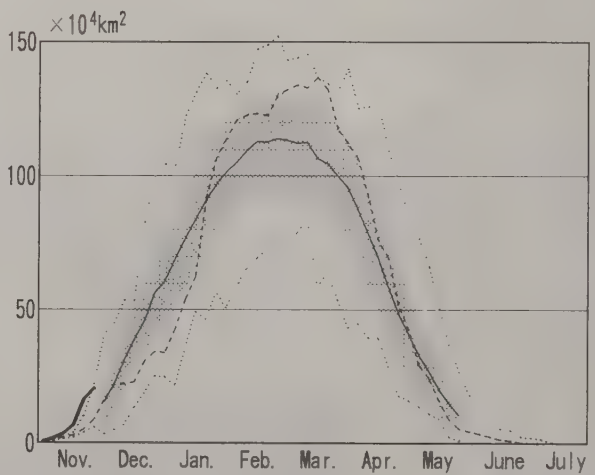
The shaded area represents the sea ice extent. The dotted line denotes the mean ice edge averaged for the period from 1973 through 1990.

The data source is the National Ice Center (USA).



第29-3図 オホーツク海の海氷図（2000年11月15日）

Fig.29-3 Sea ice chart in the Sea of Okhotsk on 15 Nov. 2000.



第29-4図 オホーツク海の海氷域面積

Fig.29-4 Time-series of 5-day sea ice extent in the Sea of Okhotsk.

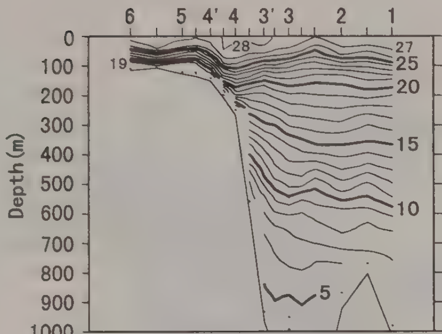
: current season (2000/2001)

: mean extent (1971-2000)

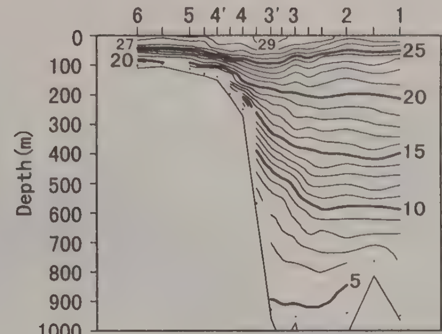
: maximum or minimum extent (1971-2000)

: last season (1999/2000)

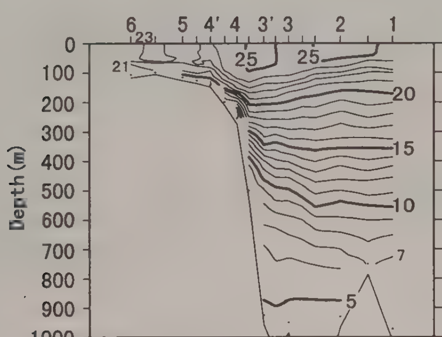
: mean ± 1σ (1971-2000)



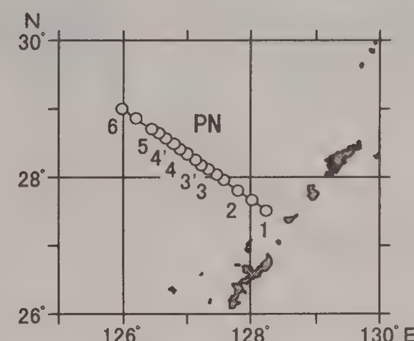
(a)October 1999

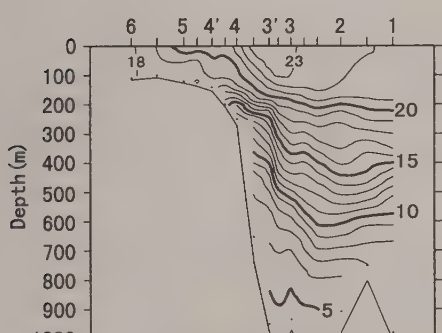


(e)July 2000

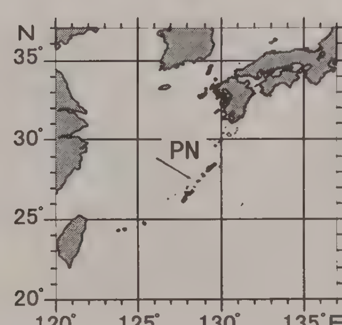


(b)November 1999

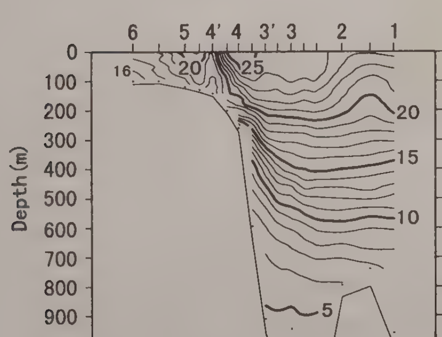




(c)January 2000



(f)Locations of observation stations and PN line

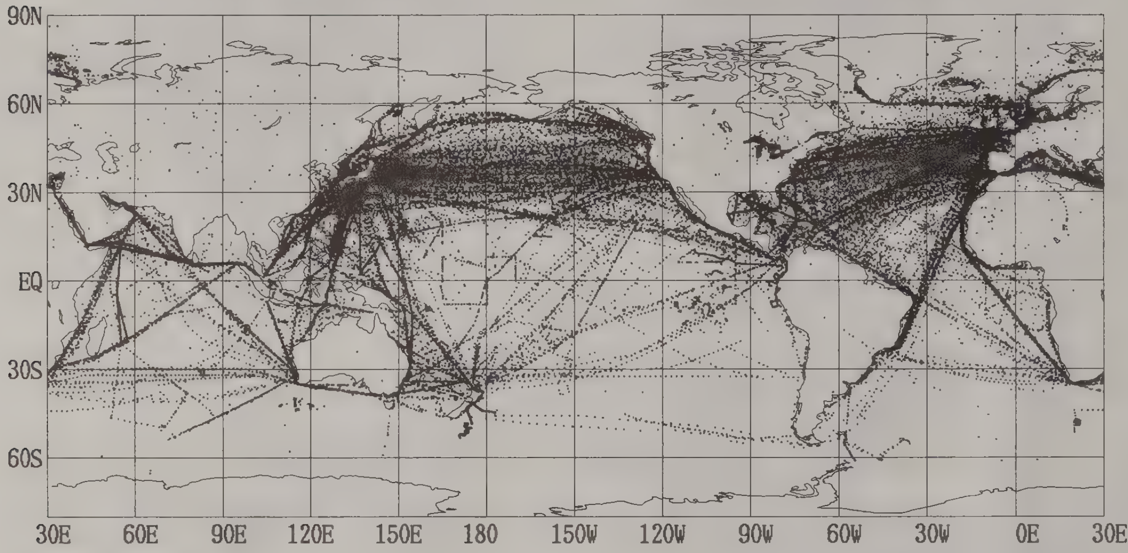


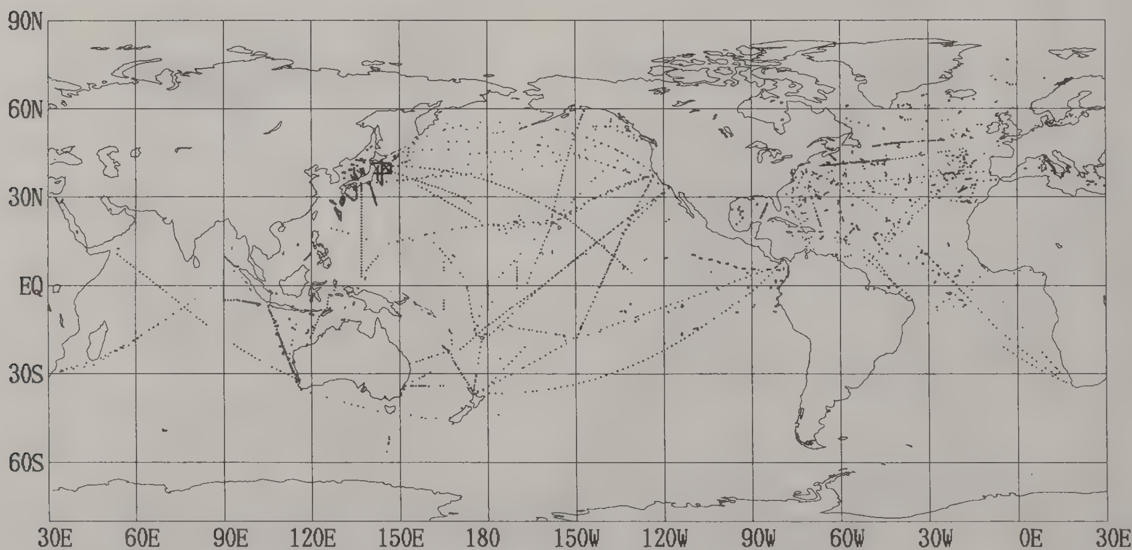
(d)April 2000

第30図　長崎海洋気象台長風丸によるＰＮ線に沿った水温鉛直断面図(℃). (a)1999年10月、(b)1999年11月、(c)2000年1月、(d)2000年4月、(e)2000年7月、(f)ＰＮ線の位置図.

Fig.30 Vertical sections of water temperature(℃) along PN line by R/V Chofu Maru of the Nagasaki Marine Observatory, JMA. (a)October 1999, (b) November 1999, (c)January 2000, (d)April 2000, (e)July 2000 and (f)Location of PN line.

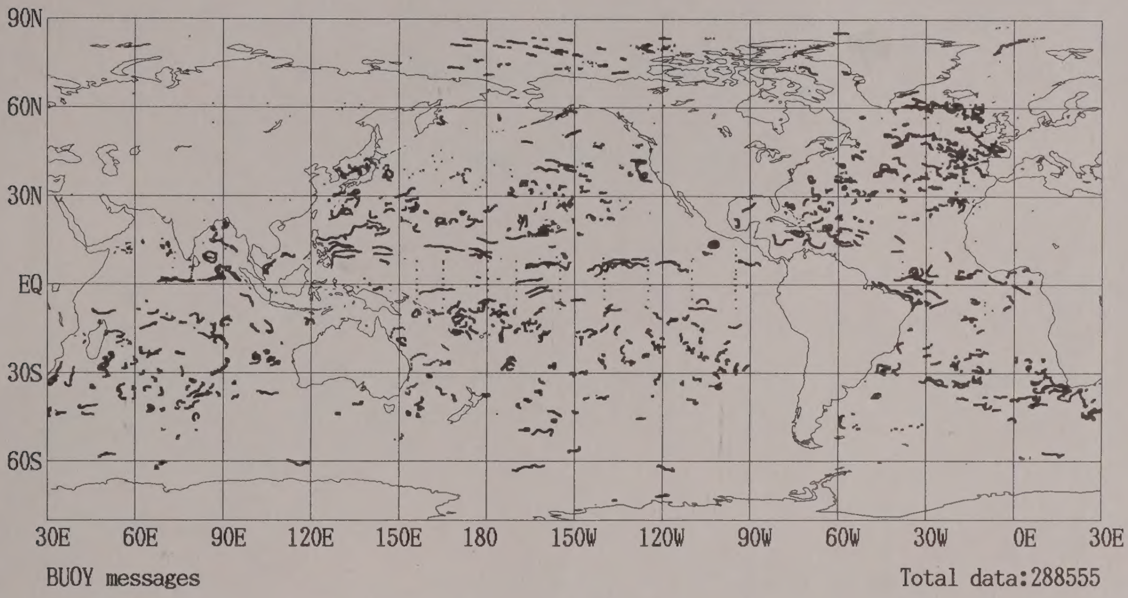
Geographical Distribution of Oceanographic Data

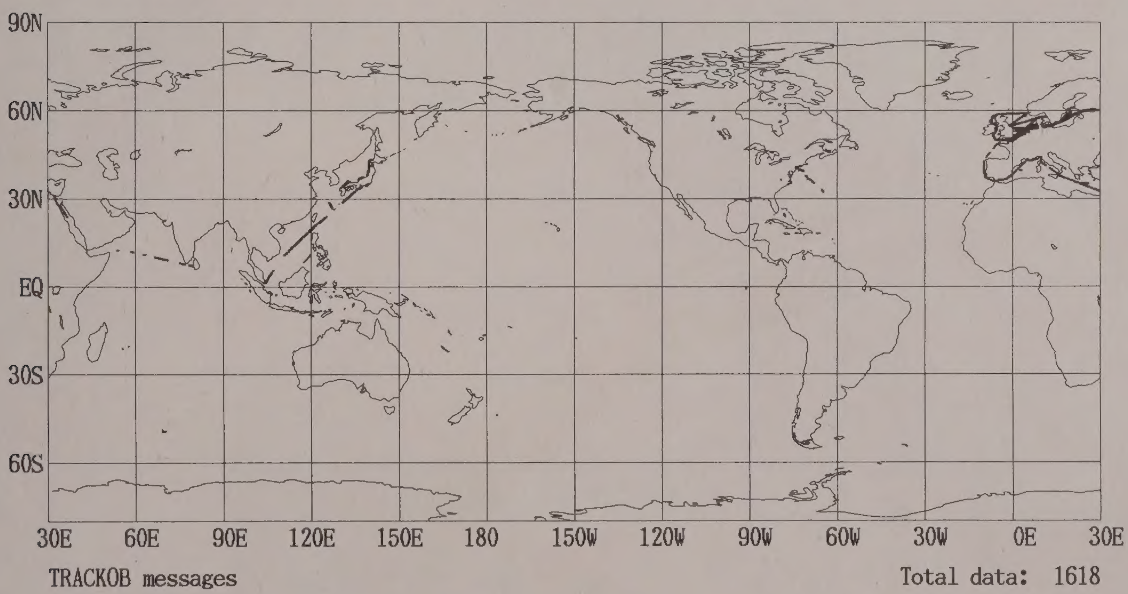




第31-1図 測点分布図(2000年11月)

Fig.31-1 Geographical distribution of SHIP messages (SST data, top) and BATHY/TESAC messages (subsurface temperature data, bottom) for NOV 2000.





第31-2図　測点分布図(2000年11月)

Fig.31-2 Geographical distribution of BUOY messages (buoy drift and SST data, top) and TRACKOB messages (ship drift and SST data, bottom) for NOV 2000.

気象庁海洋月報

Monthly Ocean Report

November 2000 (No. 95)

本月報掲載の2000年11月のプロダクトには、気象庁が観測したデータ及びGTS（全球気象通信網）を通じて入手した国際気象通報式による通報のほか、下記の機関等から提供いただいたデータを使用しています。御礼申し上げます。

防衛庁、水産庁、海上保安庁

海洋科学技術センター、（財）日本海洋科学振興財団、（社）漁業情報サービスセンター

東北大学、東京大学、鹿児島大学

水産試験場等（北海道、岩手県、宮城県、秋田県、山形県、茨城県、千葉県、東京都、富山県、福井県、静岡県、愛知県、三重県、兵庫県、和歌山県、鳥取県、島根県、山口県、高知県、佐賀県、長崎県、沖縄県）

（順不同）

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